THE

CONQUEST OF MALARIA IN INDIA

AN INDO AMERICAN CO OPERATIVE EFFORT

D K VISWANATHAN
RETIRED DIRECTOR OF PUBLIC HEALTH
BOMBAY STATE

1958

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FOREWORD

When Doctor Viswanathan asked me to write a foreword to his anecdotal account of the conquest of malaria in India I assented even before reading the manuscript For D K Viswanathan is one of India s famous contemporary quartet of dragon slayers that includes T Ramachandra Rao B Ananthaswamy Rao and Jaswant Singh The e men and others have blazed a clear trail towards malaria eradication in India Viswanathan and T R Rao in Bombay State and B A Rao in Mysore brilliantly directed local projects that proved beyond doubt the practicability of the aim of malaria eradication in India Jaswant Singh as Director of the Malaria Institute of India and of the 5 year National Malaria Control Programme 1953 1957 laid the last foundations for the National Malaria Eradication Programme begun in 1958 under the direction of B A Rao In no country do the foundations go deeper —indeed they extend to 1897 1898 and Ronald Ross who in India made the basic discovery that malaria is mosquito borne In the succeeding years Christophers Sinton Mulligan and Covell with a host of capable assistants such as Afridi Jaswant Singh Baily and Puri added stone on stone until the essential epidemiology of malaria throughout India was finally established From personal observations I know how well these foundations were laid and I have no doubt that India will succeed in eradicating malaria

I first met D K Viswanathan on February 19 1935 when in Madras Presidency we started a malaria tour that lasted until the 9th of March At that time Viswanathan was Malaria Officer of the Presidency which had a population of over 47 millions an area of some 142 000 square miles an

estimated 6 to 10 million cases of malaria a year with probably some 100 000 deaths —and a total annual budget for malaria control of 65 000 rupees (dollars 26 000) ! Viswanathan had a staff of one entomological assistant one clerk and one peon and he spent most of his time making surveys and recommendations which were largely ignored But Viswanathan was not easily discouraged I shall not forget how impressed I was by his energy and enthusiasm qualities that now almost a quarter of a century later are as vigorous as ever D K was not then nor is he today noted for modesty or a retiring disposition He talked a lot then and he still does ! But he knows what he is talking about indeed he has profound and practical knowledge of his specialty Moreover his basic integrity his innate and generous courtesy are well known to his many friends On that Madras tour Viswanathan freely offered his friendship and help which I am glad to say he has continued to extend to me throughout the years

So it is a pleasure to write this foreword and to commend to the reader the following memorabilia recorded by D K Viswanathan about man s mastery of malaria in India

PAUL F RUSSELL M D

1

FONS ET ORIGO

No 1 Arsenal Road as the name indicates is a relic of the old British army days in Poona Flanked by a picture house on either side with a busy provision stores in front it presents a bustle day in and day out without any privacy whatever but for the planning of the Government architects in placing the residential flats a little to the interior of the compound On an evening not very different from others in 1951 the telephone in No 1 Arsenal Road started ringing My wife and our son in law both jumped up from their seats in anticipation of joy tinged with a little anxiety for our daughter had moved into the Nursing Home a few hours earlier for the confinement of her first baby I was reclining in bed with a wet pack on my forehead reading one of Macdonald s earlier tough papers on the new epidemiology of malaria My wife was disappointed when she found that the voice at the other end was authoritative though polite and very far removed from the dulcet tones of the hospital receptionist. I was in no haste to reach the phone myself but imagine my surprise when I found that the call was from His Excellency the Governor of Bombay I was summoned to go to the Government house forthwith to meet a distinguished visitor from the United States This was Allan Gregg the Vice President of the Rockefeller Foundation whose sad demise only a few months ago was mourned by many friends and admirers in many countries of the world Dikshit the Surgeon-General (the Director of Medical Services who in Bombay State is different from the Director of Public Health)

was piloting Allan Gregg Apparently the activities of the Public Health Department were not considered of sufficient importance by the authorities concerned to be brought to the notice of this distinguished visitor who was to advise the *Government of India and State Governments on medical* education It would appear however that Allan Gregg asked his host Raja Sir Maharaj Singh the Governor of Bombay what the biggest public health activity in the State was The Governor promptly replied Malaria control with DDT and happened to mention my name Gregg suggested that I should meet him and hence the summons through the phone

Raja Maharaj Singh was one of the staunchest supporters of the pioneer efforts made by the Government of Bombay in its programme of malaria control Time and again he used to take a lead and get the Government House sprayed with DDT even in days when it was used in the form of a solution in kerosene I remember Rani Maharaj Singh one day getting *furious with us for having made the place stink like—* With all the meekness I could muster I said Your Excellency we sanitarians look upon the vaccination scar as a sanitary dimple and the kerosene smell in the DDT solution as a sanitary aroma Rani Maharaj Singh quickly left us The Governor saw me in great embarrassment but he was a brick He said You know Viswanathan although you talked back to my wife which I myself dared not do you haven t at all displeased her Her abruptness in leaving us was I think due to her inability to repress her smile without compromising her dignity

I may recall here yet another instance of Raja Sir Maharaj Singh s acute sense of humour I showed him a flash picture I had taken in Geneva of Rajkumari Amrit Kaur his

sister at a dinner party she gave the Russian delegates to the World Health Assembly The Governor asked me Tell me Viswanathan is all the fruit juice in those wine glasses fresh or fermented? This was his oblique reference to uncharitable—and in many instances as in the present case untruthful—criticism of the conduct of Indian Ministers that when they go abroad they act contrary to the prohibition policy of their party

During the conversation at the Government House I invited Gregg to visit my lab and after some talk with Dikshit despite the long list of dates Gregg had it was arranged that my lab should be honoured by his visit for about fifteen minutes Actually Gregg was pleased to stay quite longer at least long enough to get the gist of what the Government was doing by way of malaria control Casually I asked how much the U S was spending on publicity and otherwise to maintain political friendship with important countries I do not recollect if Gregg mentioned any specific figure but I said Give me some of that and I shall tell you of an effective way in which U S may clasp its hands in friendship with India

What is it? asked Gregg

I said We of the East generally allow our emotions to get the better of our reason You will never find in India a Mahatma Gandhi (if he had lived and cared to be in politics) or a Jawaharlal Nehru put aside in the elections or Cabinet making for years to come as Churchill was in the United Kingdom after having played a grand role in winning the War for the democratic world If you take a DDT drum with the stars and stripes on one side and the tricolour on the

other side to each of forty million homes in the country in areas with a risk of malaria the psychological impact would be so great that public opinion would swing back again in favour of democracy even in those parts of the country where there appears to be a shift towards the left

The American citizen perhaps having a little more than what he needs to satisfy his personal wants both necessary and superfluous has an innate urge to help his fellow-citizen in the world especially in under-developed countries In the fulfilment of this latent urge he looks for a manifest political motive He will naturally extend a helping hand only to those countries where democracy is accepted as the rule of life DDT service offers the most ready the most facile and the most fruitful contact with every villager In fact as some villagers have told my Chief Minister the Honourable Shri Balasaheb Kher they are aware of only two Governmental services one is the collection of taxes the other is the DDT service (This particular statement was quoted in the document presented sometime in 1956 by a few senators who reported to the U S Congress on the feasibility of global malaria eradication)

To my mind political friendship is not the sole argument I would rather stress the humanitarian aspect Malaria is a preventible disease it has been prevented and therefore it should be prevented at all costs and in all countries As Paul Russell has said no country can afford not to control malaria

For all my vehemence and enthusiasm in talking to Gregg I might just as well have talked to a figure carved in stone or marble Allan Gregg showed no response whatever—at least

none that I could make out Some time in January 1952 I had occasion to repeat the story to another American J Austin Kerr who headed the Virus Research Centre in Poona a joint venture between the Government of India and the Rockefeller Foundation with some measure of support from the Government of Bombay I must confess that Austin—we have become such family friends that the Christian name has slipped in—exhibited no better response than Allan Gregg so far as my colleagues or I could discern In fact my colleagues chided me for repeating ad nauseam this request for charity which apparently fell on deaf ears I contented myself with saying that a good idea like a good seed deserves to be broadcast Divine grace may at some time shower rains upon the soil where the seed gets embedded A cosmic gardener may weed out the imperfections and God s creatures may at some future date reap the harvest And if the seed lies barren there is no harm done

Austin by the way often used to say that I was the first American he met in India I had occasion to remember this when we bid him farewell from Poona Almost twenty years ago when I first landed in New York and stood in the lobby of the New Yorker Hotel I felt as lonesome as in the Sahara despite the eight million people who supposedly lived in the city A few minutes after I took my seat in the lounge an elderly lady walked up to me and asked me Are you from India ?

I stood up and said Yes

She then strung a long list of great names of Indian scholars saints scientists and statesmen most of whom were ealive and asked me if I knew them individually As we were

talking buttons (the bell boy) came up and said Excuse me sir there is a telephone call for you I was lost in wonder of miracle being piled upon miracle in a place where I thought I was utterly alone and unknown But when I went up to the desk the receptionist said I m sorry Doctor there is no call for you but I wanted to save you from that old lady She is a little and he tapped the side of his forehead thrice with his fingers Daft or not I thoroughly enjoyed my conversation with the lady and was annoyed with the recep tionist for his mistaken mission of mercy Anyway I said at the farewell party to Austin that that lady was the first American I met in New York and if Austin still maintained that I was the first American he met in Poona the debt between the two countries should be deemed as fully paid

A week after my conversation with Austin came a letter from my good friend Robert Briggs Watson of the Rocke feller Foundation stationed at Bangalore There was no reference to my talk with Allan Gregg or Austin but there was a flattering mention of my informal talks at the meetings of the Indian Council of Medical Research held in Hyderabad in November of the previous year He did not think in terms of malaria eradication at that time but he thought that if I could give him some views on the subject of malaria control covering the entire nation adopting the techniques that we had developed in Bombay State which was also being applied in Mysore State and in Ceylon he would be glad to call on the officials of the Government of India and the American diplomatic staff with a view to promoting the idea of a national control programme under Indian administrative auspices and securing essential supplies of DDT for the first year or two from the U S

I received the letter on the 20th January 1952 After an early dinner at 6-30 p m I sat at my typewriter and completed a note on a national malaria control programme in India furnishing my ideas about men methods munitions and money towards its fulfilment A few extracts from that letter will perhaps not be inapposite

Personal and Confidential

Poona 20th January 1952

My dear Watson

I was greatly interested in having your letter of January 16 As a matter of fact it is a very happy instance of two wits jumping together because only a few days ago I was warmly canvassing with Austin the possibility of a national malaria control programme in India taking advantage of the recent change in the political horizon concerning India and the U S and the economic pact signed by the Prime Minister of India and the American Ambassador in India I was particularly gratified to find Health included in this programme and I was discussing with Austin how among all health programmes one could so usefully embark upon a national malaria control programme You will recall that in the book I published Malaria and its Control in Bombay State in 1950 I had a section under the heading The Call to Arms and I said What better scheme for aid from President Truman s Point Four than a malaria control programme in India ? Austin felt a little doubt whether we had enough leadership in the country I told him that I could put up a blueprint dividing the country into regions for direction control and co-ordination and into viable units of a million population in each at the periphery and even

The obvious choice for the kingpin of the whole show will be Jaswant by virtue of his position as Director of the Malaria Institute of India and his experience of international men and affairs As the scheme however is colossal in its extent and cost would it not be better to elevate Jaswant to an elder position for the purposes of the scheme and entrust the privilege of actual implementation of the scheme to a distinct service headed by some of us who have sprayed a few houses like B A Rao and myself with the understanding however that we would work under the overall guidance of Jaswant My feeling is that we may have a national committee at the Centre with Jaswant as its Chairman

In my opinion it is essential to have five regional organisations in order to make good the gap that some States will inevitably have in their malaria organisation In selecting the personnel we should take care that they could follow the mind of the mosquito which is the local vector

The operational cost may be estimated at approximately 153 000 rupees per unit or about 30 6 million rupees for the whole country or roughly 6 8 million dollars For a period of two years the cost will be 13 6 million dollars The total cost then will be about 28 6 million dollars for two years Already the various States and the Centre are spending about three million dollars every year but the proportion of the country with malaria control service is less than 20 per cent If the present national budget is doubled and if the U S aid suggested above is made available the entire continent can have a full fledged malaria control programme The further maintenance of this service will no doubt need serious consideration I may state for your information that proposals involving taxation are contemplated by the Government of

Bombay And during my talks with villagers I gathered the impression that while they would certainly plead for the free service to continue for as long as possible if they were left with a choice to pay taxes and to have the service continued or to have it discontinued on account of non payment of taxes they would unhesitatingly vote for the former What is needed is a mass impact I feel sure that *vox populi* would inevitably prevail and provide the sanction for the continuance of the programme

Finally I would like to say this I have freely indulged in thinking aloud in some of my remarks You are at perfect liberty to utilise whatever you find in them useful to advance our common objective Only I should like to make a categorical assurance that even in the depth of my daydreams I do not wish to tread on anybody else s toes In a national programme personalities must inevitably be sacrificed to policies With kindest regards

I added a postscript as follows If there is any element of doubt in your embassy circles if we in this country could be expected to spend such a large sum usefully I would take the liberty of suggesting that (your ambassador in Delhi) the Honourable Mr Chester Bowles and Mrs. Bowles are welcome for a short holiday in Kanara We can arrange for a tiger shoot and they can make personal inquiries of as many people of the district as they like of what the Government of Bombay has done by way of malaria control

On the 28th of January 1952 I received Bob s reply together with a most thoughtful a most complete and at the same time a most concise statement of the whole problem for the consideration of the American Ambassador in Delhi He asked for my clearance of his draft which was

only a formality for there was really nothing in the draft for me to amend before clearance It was so well reasoned and it was so pointed However lest Bob should think that I had lost my critical faculties I forwarded a few inconsequential comments the same day to his address in Delhi where he had gone in his mission to sell the idea to all concerned On the thirty-first of January I received his cable from Bangalore Proposition sold successfully This was followed by a letter dated February 2 which gave me a complete background history of his discussions with Jaswant Rajkumariji and Raja Jaswant rightly insisted that the programme should be called a national service and must be central in its administration Rajkumariji was enthusiastic Raja approved of the scheme in principle but felt that the administrative plan would take some thought More important than all Bob reported that the Ambassador was quite enthusiastic and that he promised to cable Washington that day itself for permission to get the scheme moving He was anxious to get a move on during 1952 itself The Ambassador s desire that he would like to see me in Delhi conveyed to me by Bob really touched me Bob was asked by the Ambassador to set aside two or three days for Washington during his next visit to New York for consultations in order to be able to talk to the State Department people and President Truman about India An Advisory and Planning Committee was formed within the Ministry of Health of the Government of India in connection with the Point Four work It was agreed that representatives from the Embassy the Ford Foundation UNICEF and WHO should sit on this Committee and of course Bob on behalf of the Rockefeller Foundation On the 12th of February I had a cabled request from Raja to send

him a copy of my note and the figures regarding Dr Watson s malaria scheme Though I could not send a verbatim copy of my letter to Bob I sent to Raja a connected account of the proposals I got a copy of a later cable he sent to Bob in Bangalore the text of which was as follows Consulted Dr Warner (she was the TCM adviser on health to the Ministry of Health with the Government of India) Malaria programme being accepted Considerable progress towards implementation expected this year but completion of the full programme expected only next year

Bob was in D lhi again during the first week of March He had long consultations with Ambassador Bowles and later with Raja Warner and Jaswant and still later with the other members of the Co-ordinating Committee which included the Secretary to the Ministry of Health (Menon) Lakshmi narayana of the Planning Commission Davies of the UNICEF and Chellappah Tuli and Livadas of WHO The gist of the discussion was as follows

(i) The national programme is approved in principle by both Governments and has received the blessing of the Co-ordinating Committee

(ii) Ambassador Bowles has set aside from TCA funds 1 26 million dollars to get things moving at once and this must be committed by midnight of 30th June 1952

(iii) I C A will allocate funds from their budget for the fiscal year 1953 on the basis of revised estimates presumed to be about 10 million dollars

(iv) The Planning Commission and the Ministry took the position that the NMP administration should b a function of the Malaria Institute rather than of an ind pendent agency

of the national health service The Bhore Committee Report was cited as an authority for this position

(v) Jaswant was directed to prepare requests for B A Rao and me to go to Delhi to implement the programme in association with him

This was the beginning of the hand clasp between two great countries and whatever arguments some of us may have advanced in our own small efforts to bring this about it should be stated in fairness to the participating countries that no strings of any kind were attached for this bilateral assistance The U S sought no political assurance nor were any foreign technical personnel sought to be imposed on the country India on her side did not feel called upon to give any guarantee except to utilise the assistance reinforced by local resources to implement the common objective of improving the nation s health by fighting malaria the greatest scourge which has always stood between human endeavour and accomplishment in every field of national development

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THE INDIAN NATIONAL MALARIA CONTROL PROGRAMME

THE JASWANT-WARNER ARCHITECTURE

Once the preliminaries as described in the first chapter were completed the need arose for preparing a formal document containing the main features of the Indian National Malaria Control Programme and the responsibilities that various authorities national including the State and the Central and international had to assume for an effective implementation This task was undertaken by Colonel Jaswant Singh the Director of the Malaria Institute of India and Dr E Warner of the United States Public Health Service who had been assigned as Health Adviser to the Government of India for the TCM programmes

Although the main operative features of the plan which were furnished to Dr Watson and by him in turn to the concerned authorities were retained in the plan elaborated by Jaswant and Warner specific alterations were made in the administrative and organisational set up as well as in the logistics of the plan However much one may in impatience grieve at these alterations subsequent events have shown the wisdom and maturity of experience of the Jaswant Warner axis in making the plan as they did

The main alterations made in the plan were

1 The States in India were made to bear almost the entire financial burden for the programme within their borders excepting only for the supplies of insecticides and transport

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to be made by the TCM This was in keeping with th complete autonomy of the States in all matters of healtl excepting international obligations or certain other matter in which the Centre and the States had concurrent powers On the one hand assumption of complete responsibility by th Centre over and above what the States were already spendin on malaria control within their borders would involve : concomitant assumption of administrative responsibilities *which may be deemed to trespass into the domain of Stat* autonomy in health On the other hand as we feared making the States responsible for their financial share of local operational costs may leave some of the less progressive States outside the scope of the programme which could therefore not be truly called national It must be said to the credit of the Government of India that they succeeded in persuading most of the States to toe the line with their proposals and assume financial responsibility

2 Immediate coverage of the entire malarial areas in the country was not contemplated in the first year itself but the plan contemplated a progressive staggering to reach the 200 endemic units within a period of three years To our thinking this would involve delay in total coverage the avoidance of which would obviously be preferable on grounds of efficiency and ultimate economy But Jaswant and Warner and others of their thinking in the Government of India felt that the programme was so large in magnitude that it would be prudent to provide for a staggering rather than to embark upon total national coverage in the first instance itself

3 The Director of the Malaria Institute of India was made responsible for the direction and co-ordination of the national plan throughout the country while our proposals

visualised the establishment of a separate director and joint director for this service leaving the Director of the Malaria Institute of India free to undertake training and research and to guide the programme from above without actually being sad dled with the responsibilities of the day to day administration

4 Our provision for regional organizations the chief of each organization being specifically conversant with the behaviour of the vector species of anopheles of that region did not find acceptance Instead there was some strengthening of the staff of the Central Malaria Institute

5 In view of the then non availability of imported DDT wettable powder of higher concentration and in view of the locally formulated wettable powder containing 50% DDT technical not giving constant results our proposals provided for the use of DDT emulsion But the final pro posals provided for the use of DDT 75% wettable powder imported from the United States which I am glad to say has since been found to give constant results as good as emulsions While some people claim that the wettable powder has been found to give superior results to emulsion it has not been so far my experience in Bombay State But as it gives as good results it is obviously much more convenient to use wettable powder

Being far away from the hub of activity Delhi the capital of India I was not conversant how speedily the plan was progressing towards its final acceptance by all concerned authorities I therefore tried to canvass further support from such influential quarters as I possibly could Shri B G Kher the then Chief Minister of Bombay State was about to lay down his office and Dr Gilder who was the Health Minister had also given an indication of his desire not to continue in

office The Bombay State had by that time already extended the DDT service to a fairly large population and had satisfied themselves of its immense potentialities of relieving human suffering and death and above all increasing the exploitation of land in areas in which it remained fallow hitherto on account of the ravages of the disease I therefore persuaded Dr Gilder and Mr Kher to bring to the personal notice of the Prime Minister of India Pandit Jawaharlal Nehru the *immense potentialities of a national malaria control programme* if the promised assistance from the United States was forthcoming The Prime Minister promptly replied indicating his interest and expressing his view that the Finance and Health Ministers would no doubt do the needful in an important scheme of this kind affecting the health and development of the entire country Meanwhile Dr Watson was in the States and was writing to me frequently about the progress at that end Although we had strong feelings that the proposals that were originally conceived would be more *useful to the country I made Bob understand quite clearly* that Jaswant and Warner should have adequate reasons for the changes they have made and that I for one do not in the least feel that their attitude should cause us any concern I wrote him once that I was thoroughly chastened and my only interest was that somehow in some form or other the national programme should be instituted at the earliest pos sible date In reply Bob congratulated me and sent me a quotation from Hebrews (the New Testament) 12 5 et seq

My son despise not thou the chastening of the Lord nor faint when thou art rebuked by Him

For whom the Lord loveth He chasteneth and scourgeth every son whom He receiveth

If ye endure chastening God dealeth with you as with sons for what son is he whom the Father chasteneth not!

For if ye be without despisement whereof all are par takers then are ye bastards and not sons

Now no chastening for the present seemeth to be joyous but grievous

Nevertheless afterwards it yieldeth the peaceable fruit of righteousness unto them which are exercised thereby

I was somewhat remiss for a little while in my correspondence with Bob which promptly brought a reminder from from him stating—

It has gotten to the place that when I did not hear from you fairly frequently I worry lest you are ill or angry with me

Early in May 1952 I received a call from the Union Public Service Commission for a general talk with them in connection with my possible appointment as Jaswant s deputy to be associated with him in the national programme It was earlier agreed in Delhi that both Dr B A Rao from Mysore and myself would be drafted to Delhi to assist Jaswant in this programme Though I did not very much appreciate going through the usual channel of the Public Service Commission because I had not formally applied for any post I complied with their request and met them in D lhi On that day however to my great consternation I found that two junior men were also invited by the Commission as my fellow com petitors at the interview One humorous circumstance in this connection would merit mention One of the competitors who was called for the interview before me was asked by the Commission as to what books on malaria he reads And he

promptly replied Malaria and its Control in Bombay State by Dr D K Viswanathan I was of course ignorant of what happened When my turn came one of the members of the Commission asked me if I had published any such book I had a copy with me which I handed over Then the member told me how he knew of it and later asked me whether the book was a pre publication copy because the price of the book was not mentioned I said that if I could say so it was a post publication copy because it was the only copy available and as regards price I said perhaps that was not the only omission in that book Later the Chairman talked to me about salary and his own limitations as to what he could recommend to Government to offer me and he added that I should be quite aware of all that from the advertisement issued by the Commission I merely contented myself by pointing out to the Chairman that the Commission had so far had no application from me for that post and if I appeared before them that morning it was only in specific response to their invitation to have a talk with them

There was no attempt at that time as far as I was aware to ask for Dr B A Rao s services and even the attempt to secure my services appeared to have been made in the usual course of filling a post in the Malaria Institute of India

The national programme was being considered at various levels of the Government of India including the Planning Commission It is inevitable that a proposal of such a magnitude takes time before it is finalised after careful scrutiny by all the concerned authorities However we were getting impatient more especially because of the possible uncertainty of TCM aid in future years We tried to get a reorientation of

the proposal more on the lines on which it was first made enlisting the services of one of the most respected members of the Union Cabinet He passed on the suggestions to Rajkumariji She was pleased to express agreement and said that there was nothing new in our suggestions Of course the difference lay more in technical details and logistics of the programme At the ministerial level it is perfectly true that there was no demonstrable difference in the proposal originally made and the proposal finalised at the Government of India level Rajkumariji also told her Cabinet colleague that she recently carried out four experiments in Mysore Madras Uttar Pradesh and Orissa in order to show Government what could be done These were relatively small scale schemes sponsored by Government jointly with the World Health Organisation each project serving about fifty to sixty thousand population But at that time in certain States in India more than ten million people were already being protected !

We had word in June from Bob that Ambassador Bowles had written him to say that Watson s malaria control programme was progressing satisfactorily at the TCM end Later we had a cable that the programme had been sold The cable reached me late in the evening but no hour was too late to share the thrill with Dr Kerr of the Virus Research Centre who was a very strong if seemingly silent supporter of our project Despite prohibition being in force in Poona for a number of years the temptation to celebrate the occasion was great but the desire to respect the law ultimately prevailed

It is only in the middle of December 1952 that the agreement was signed between the TCM and the Government

of India and it was extremely in the fitness of things that the person who signed the agreement on behalf of the Government of India was Mr S G Barve of the Finance Ministry who in 1945 was the Collector of Dharwar district in Bombay State and was one of the two great pillars (in the Civil Service) of very strong support to the rural malaria control scheme in that State at that time

The official procedures required to enlist my services at the Centre took many months In the meanwhile an opportunity offered itself for me to assume position as the Director of Public Health of Bombay State I gave the matter my careful and anxious consideration and eventually decided to stay on in Bombay and assume responsibility for a State wide malaria control scheme at least in one State rather than deputising in Delhi in what then appeared to me to be a somewhat truncated scheme of national malaria control

The total expenditure that has been spent on the scheme up to date is as follows

Year	TCM	Govt of India (including State Govts)
	$	Rs
1952 1953	5 14 462	
1953 1954	5 200 000	17 795 000
1954 1955	4 053 297	22 535 000
1955 1956	4 007 000	22 000 000
1956 1957	7 0 4 000	44 000 000
1957 1958	6 500 000	
Total	27 298 759	106 330 000
		or
		$ 21 267 200 + about 8 800 000 in 1957 1958
	Total	30 067 200

Grand total of expenditure on the scheme during the last seven years $ 57 365 959

Towards the end of 1957 58 about 230 million are under protection During the first year a little less than 100 million people were actually protected Assuming the average popu lation protected during the period to be 150 million the total cost for this seven year period has been about 40 U S cents per capita or about 6 U S cents per year The results of this programme are briefly detailed in a separate chapter but enough has been said on the organizational and administrative side to show how the handsclasp between the countries which started in 1953 has steadily been made firmer in its grip to bring about an improvement in the health of one country and a sense of satisfaction in the other country This however is not the end of the story though it may be so far as this book is concerned The pact of friendship has become much more firm in 1958 when an agreement has been signed between the two countries to gear the objective of the national programme from control to total eradication of malaria

The newer aim of total eradication of the disease is the result of the impact of world opinion channel led through its accredited health agency the World Health Organization In the wake of large scale malaria control programmes undertaken in several countries of the world exploiting the Second World War discovery of the use of DDT as a residual insecticide two technical points were sharply brought to focus One was the possibility of fortuitous eradication of the disease even in countries where such an aim was not specifically planned in the first instance The other was the growing development of resistance on the part of one insect after another of public health importance If nature showered her grace in making

the first experience possible for the good of humanity nature through her experience equally urged man s ingenuity to plan eradication which has been shown to be possible before the hazard of resistance develops in the malaria carrying mosquito The eighth ninth and tenth World Health As emblies took note of these two aspects of the *problem and made specific* recommendations to all countries to embark upon malaria eradication and to the World Health Organization to explore ways and means of collecting the necessary finances for embarking upon a global eradication plan Limitations on account of the author s present official position and close propinquity in point of time to these valiant efforts that are being made in all quarters put a check on the somewhat legitimate desire to elaborate these interesting developmental phases Suffice it to say that the United States had made planning for global eradication financially possible and in that process has agreed to collaborate with the World Health Organization The funds of the United States through its International Co-operation Administration continue to be made available by bilateral pacts but in addition they have also generously contributed to the malaria eradication special account of the World Health Organization for rendering such *aid as may be technically determined from time to time*

India as one of the most consistent supporters of all liberal policies in such international organizations not only played her due part in crystallising world opinion in this behalf but she also brought to bear the consensus of world opinion in defining her own objective in the total conquest of this disease

During the last three years of the Second Five Year Plan period India s national malaria eradication plan would cost

about 90 million dollars which is made up as dollar aid to the extent of 38 4 million dollars and rupee expenditure equal to 51 5 million dollars Of the 38 4 million dollars to meet dollar costs the World Health Organization has agreed to provide 1 5 million dollars in 1958 besides some additional assistance in other fields The United States directly provides the balance of 36 9 million dollars The national plan also provides for a further rupee expenditure during the first three years of the third five year period to an extent of a little over 23 million dollars Thus the total cost of malaria eradication not including the cost of the preparatory phases when malaria control was the objective comes to 113 million dollars for a total population of 390 million If the earlier cost is included the total cost comes to 170 million dollars or roughly 43 U S cents per capita A later chapter shows that the dividends which have already accrued and are further expected from such a capital outlay will be hundred fold if not even more

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3

THE BOMBAY MALARIA ORGANISATION THE PRE DDT PERIOD

This organisation was created under peculiar circum stances The Earl of Scarborough Sir Roger Lumley as he then was went on a tiger shoot to Yellapur in Kanara District when he was the Governor of Bombay A fortnight after his return to the capital he developed malaria About a month still later he happened to visit Lord Linlithgow the Viceroy of India Lord Linlithgow had two hobbies in life One was the popularisation of the breeding bull and the other malaria control Sir Gordon Covell the director of the Malaria Institute of India had no small part in the development of the Viceroy s second hobby Sir Roger happened to mention to Linlithgow the unhappy result of his tiger shoot Promptly it was decided in the Viceroy s house in Delhi that Bombay should have a permanent malaria organisation to deal with a menace which dared to include amongst its victims such an august person as the Governor of the State Sir Gordon was sent for on the telephone and between them the skeleton Bombay organisation was formed The result was a cable which I received when I was fighting the war in the jungles of Assam The cable said that I would be released from the army if I agreed to lead the Bombay malaria organisation Beggars cannot be choosers and in this particular case I am not sure that the alms I received was any different from my own choice Only a few weeks ago we had the first Japanese bombing in India at Imphal We left Tamu in Burma at five in the morning As we reached

Imphal at ten I broke the rule of the convoy and overtook a fleet of several trucks carrying the malaria squad and Captain Sambasivan and I had just got into the portico of the Dak Bungalow at Imphal when the bombers were over us The entire fleet of our trucks slowly moving on the road was machine gunned with a casualty of more than eighty killed Although I then thought that I was presumably destined to die of judicial hanging and therefore could not die of Japanese bombing Sir Gordon s cable offered a welcome solution even if it involved the risk of a charge of cowardice a charge which truth compels me to state could not entirely be refuted

My release took some time and meanwhile my distin guished colleague Ramachandra Rao had taken charge as entomologist in the newly created permanent malaria organisa tion in Bombay State with headquarters at Sirsi in Kanara District I joined him and the other members of the staff in January 1943 Jacob one of the most painstaking malaria workers that I know was assigned from the Malaria Institute of India to carry out a survey and train the local staff

Kanara District was the paradise of malariologists in so far as malaria surveys and investigations were concerned In certain months of the year you could send out an insect collector and if he came back with only two specimens of *Anopheles fluviatilis* you had every chance on dissection of finding one of them in an infective state—the most ideal place to impart training in malariology I remember during our wanderings in the district we met a very well informed agriculturist who had the ingenuity to harness a small canal flowing down the hills to generate enough power to give him electrical illumination in his house—perhaps the first hydro electric project in the district He told us that he had no

doubt that we would carry out extremely interesting scientific investigations that some of us would perhaps get doctorates for our investigations but he and his fellowmen in the district would equally doubtlessly continue to suffer from the ravages of malaria To prove that he had no malice against us he entertained us most sumptuously I may state in passing that this agriculturist five years later publicly acknowledged after the successful introduction of the DDT scheme in the district what grave injustice he did us when he first met us To our amazement he added that with the advent of DDT service he had lost his vocation of social reform in the field of widow remarriage because there were far fewer widows after the introduction of the DDT scheme !

Our earlier attempts in experimental control of malaria with the methods then known to us were attended with poor results and in one village there was a greatly enhanced prevalence of malaria after a programme of pyrethrum spray killing This was a rude blow to my colleague Ramachandra Rao who I have always considered was a gift to the Bombay organisation from that distinguished U S malariologist Paul F Russell Ramachandra Rao was associated with him for more than five years in Pattukkottai in Madras State Their association in that part of the country always yielded promising results no matter what type of experimental malaria control they adopted The inference was obvious that the fault lay with the new leader in the Bombay State At one time I was asked by my director as to what I proposed to do since all these experiments appeared to have failed I said that it would just be time to give me a new assignment. However neither Ramachandra Rao nor myself was prepared to take things lying down The result was a series of

experiments to study the behaviour of the local vector species *Anopheles fluviatilis* From the end of 1943 to the end of 1945 was a most thrilling period in our technical pursuits We had visitors from many countries of the world in that far off practically unknown place in India Sirsi We tried to determine what proportion of *fluviatilis* preferred to rest indoors during daytime and how many preferred to seek outdoor shelters during the night itself after completion of feeding We determined the period taken by the mosquito for its gonotropic cycle Mosquitoes it may be said are more regular in their habits than even humans for while a meal of blood is necessary as much for their life as for the development of their young ones mosquitoes take a second meal of blood only after the previous meal is completely digested and the eggs are fully developed and deposited in a water place The Kanara malaria mosquito was an almost obligatory man eater That is why despite its numerically very small prevalence it was able to transmit malaria to the extent of establishing hyperendemicity in the district

We discovered that this mosquito generally entered houses at dusk and the bulk of the entry took place in the earlier part of the night. While feeding went on throughout the night a substantial amount of it occurred even in the first quarter This has a great bearing on the methods of personal prophylaxis The use of a good mosquito net is rightly recognised to be the most effective single method of personal prophylaxis against malaria Unless therefore one retired in a mosquito net before dusk in Kanara district and had one s supper hand d in and taken from abed the use of the net in the later quarters of the night afforded no complete protection. Of course there still remains yet another popular personal

prophylactic measure developed during the last War hugging Mary (dimethyl phthalate) or *Betty* (*dibutyl phthalate*) just before dusk These culicifuges repel mosquitoes and *prevent them from landing on the skin of man*

We designed and carried out various *experiments releasing* mosquitoes in various stages of gonotropic cycle after *marking* them with printers dust *gold* and silver and we were able to recapture as many as ten per cent of such released specimens during the five or six days subsequent to the date of release Sometimes if we released a gravid female at six in the evening we could recover her in the solitary *house on the banks of a ravine stream* where we carried out our experiments almost within an hour after the release with her ovaries completely empty and with her gut full of fresh blood At the time of the release her gut was totally empty and her ovaries were full of mature eggs In less than an hour *therefore the mosquito had gone to a water place laid the* eggs come back to the house and completed her meal of blood Dr Strode the *Head* of the Division of Medicine of the Rockefeller Foundation in New York who came on a visit to us along with Marshall C Balfour the Foundation s representative in India saw this remarkable experiment of recapture of the mosquito within an hour and said that we must have had an *invisible thread drawn round the legs of the mosquito*

Earlier work on the breeding habits of this mosquito had established that slow running streams with marginal vegetation *and seepage pools* constituted the most prolific breeding places One of our earlier experiments in malaria control therefore consisted of *maintaining all streams and channels* absolutely free from any marginal vegetation resulting in a marginal velocity far above the critical threshold which

fluviatilis larvae could tolerate In quite a few villages we had nearly a hundred miles of streams and channels maintain ed in this condition for a full year Our method was extremely successful in that not a single *fluviatilis* larva was collected from these breeding places while in the previous year they used to yield almost the bulk of our collections of larvae of this species But malaria transmission continued unchecked and we were able to collect adult mosquitoes of the species to nearly the same extent as in the previous year We did not have to go far in our earch for *fluviatilis* larvae During our early investigations we found that *fluviatilis* larvae were almost entirely restricted to about a quarter of a mile from the nearest human habitation and seldom were they found more than half a mile With the failure of this type of experimental malaria control we tightened up our investiga tions and we discovered that the terraced rice fields over which water was in continuous motion or there was seepage of water from beneath the soil also contributed to the breed ing of *fluviatilis* larvae The other species found in these breeding grounds were so numerically large and *fluviatilis* larvae were so few that apparently we missed the latter in our earlier investigations even as most of our colleagues did in Wynad and other places in South India Although the den sity of larval output was extremely small the total acre age of terraced paddy fields was so large that the resultant numerical output could well account for our collections of adult mosquitoes after the channels and streams were main tained in a practically weed free state and ceased to breed this species We later discovered that the degree of success that was associated with our experimental methods—clean weeding of streams and channels—was inversely proportional to the

acreage of terraced rice fields in any locality We however failed to discover this association earlier than when we actually demonstrated terraced rice fields as an important *fluviatilis* breeding ground

Our experiments with chemotherapy were none too successful for the sole reason that we could not get the public to take a sustained interest and accept the drug all through the year

Pyrethrum spray killing we thought would be of great value following the successful demonstration of its utility in Delhi and in Pattukkottai and its partial success against another vector species *A minimus* in Assam We found however that during the year in which we carried out this experiment in Mundgod about 30 miles from Sirsi the incidence of malaria was twice as much as in the previous year Though it was not true we tried to disarm our critics by stating that by pyrethrum spray killing we had increased malaria transmission

Our spray killing programme was carried out twice a week during the usual malaria season from July to the end of October Obviously this was not adequate to prevent malaria transmission Although when Sir Ronald Ross made his epochmaking discovery in India nearly sixty years ago that the *anopheles* mosquito transmits malaria and although to begin with attention was directed mostly to the killing of adult mosquitoes this was not found to be a practicable measure by reason of the active habits of the adult mosquito when on the wing Almost forty years later pyrethrum spray killing was demonstrated as a useful malaria control measure in South Africa This was followed by similar work in and about Delhi by Sir Gordon Covell and his colleagues and in

Pattukkottai area in Madras Province by Paul Russell and his co-workers I myself had partial success with this method against *minimus* transmitted malaria in some of the tea gardens of Assam Province By simultaneous studies on the wing grades and ovarian development we were able to establish in Assam that after pyrethrum spray the mosquitoes were shorter lived though their densities were unaffected In other words the mosquito lived long enough to breed but not long enough to transmit This was the phenomenon of interception ably described by Dr Gabaldon of Venezuela after the use of DDT against certain types of malaria carrying *anophelenes* which rest largely outdoors *Fluviatilis* in Kanara apparently rested so largely outdoors that a programme of spray killing twice a week with a contact insecticide like pyrethrum was not of much avail at all events in a year when malaria transmission was most active

This failure led to further studies on the habits of *fluviatilis* and we determined that during the cold weather sixty per cent rested indoors and forty per cent flew outdoors for daytime shelter and during the rest of the year more than sixty per cent resorted to outdoor shelters by day and only less than forty per cent remained indoors From a teleological point of view nature provides the mosquito with an instinctive behaviour to have rhythmic activities which would serve some purpose or other to maintain its functions in life Thus when a mosquito is fully gravid and has to lay eggs in a water place which it generally does at or after dusk its rhythmic movement which occurs every day towards evening directs it outward from its resting places towards the water place And in the vast majority of cases the rhythm continues and after completing oviposition the

mosquito continues its movements but this time in the reverse direction from the water place to the place of occupation of its host of predelection Likewise it has a rhythmic move ment at dawn which it utilises for improving its place of shelter by daytime in order to give it the best chance of digestion of blood and simultaneous development of the eggs Taking advantage of these principles we made several theoretical calculations in order to arrive at the minimal number of frequencies of spraying pyrethrum and the most suitable spacing in between We found that with a sixty per cent. movement outwards every night after feeding a programme of two consecutive days of spraying followed by one and two sprayless days alternately (which means a four day spraying programme every week) would leave a residue population at the end of a fortnight the usual period of extrinsic incuba tion of human malarial parasites of less than five per cent of the original population of mosquitoes We put through such a programme in the same place where we failed in the previous year and demonstrated a spectacular reduction in the incidence of malaria

Likewise we supplemented our programme of clean weeding streams and channels with Paris greening terraced paddy fields in the close proximity of human habitations This combined measure also yielded satisfactory results

Despite our earlier disappointments we were able to find a reason for our failures determine a remedy for them and actually prove the beneficent results of our painstaking investigations

All this proved to be wholly unnecessary with the war time discovery of DDT as an effective residual insecticide Service is the highest worship at the altar of science and the

spraying of DDT is doubtless a most fruitful service to a malaria stricken people We however venture to doubt if we would have had the daring to propose a service of such great magnitude as to serve about a million population if we did not have the benefit of worship at the altar of science of patient investigations into the habits of the mosquito careful reasoning for our earlier failures planning newer methods of worship in the light of this reasoning and having science grace our fresh attempts with patent results

The advent of DDT and its proved success in controlling and even eradicating malaria in many countries of the world has given rise to the impression that pre control surveys of the relevant epidemiological features were no longer necessary and that spraying service could be undertaken in any and every malarious area even in the absence of prior surveys

In Bombay State we had five survey teams with the help of which we were able to map out the distribution of malaria in every district of the State determine the particular species of anopheles which transmitted malaria in each district and compile some basic malariometric data such as childhood spleen and parasite rates and infant parasite rates in addition to getting records of the densities of the vector species of mosquito in fixed catching stations during different months of the season of transmission Such detailed surveys provide the basic data which would lend themselves to comparison after the establishment of control procedures and provide a quantitative precision to back qualitative appraisals of the progress which may have been made What is even more important is that such surveys provide the technical personnel with a confidence with which to embark on control procedures and to take stock of the progress which may be made steadily

or to find a reason for lack of progre s with the desired speed or even a setback in results

While it may not always be necessary to plan such detailed surveys in every part of a country prior to the institution of control procedures the need for some preliminary investigations in a representative part of the different zoographical areas of the country cannot be disputed for only then would a scientific scrutiny of the reasons for any failures in the control programme be possible followed by the adoption of suitable measures to circumvent such failures

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4

THE BOMBAY MALARIA ORGANISATION

THE DDT ERA

In November 1944 Sir Gordon following his usual practice of reviewing progress in malaria research and control made in different countries of the world not all of which may have been published in medical literature gave the malariologists at the annual meeting of the Indian Council of Medical Research an account of the brilliant and spectacular success following the use of DDT in typhus and malaria control in some parts of Europe He added that this wondrous drug has been made available by the U S for use by the operational troops in the Eastern theatres of War Only a year or two earlier Sir Gordon had described to us the brilliant work on chemotheraphy carried out by a team of workers under the leadership of Brigadier Hamilton Fairley in Cairns in Australia and now there was this new wonder drug which apparently could be used very successfully to snap the mosquito link in the chain of malaria transmission

I asked Sir Gordon if we could have a small quantity for experimental trials in civilian population, for I said its war time use may not give us the necessary schedules of dosage frequency output of work etc all of which have a profound bearing on costs which in the final analysis is the most important factor in the peacetime use of the drug for a mass disease control programm

Sir Gordon sympathised with me but said he had no authority *to arrange for the sale of the drug for civilian use* I claimed the right of the community to which I belonged and begged for a free supply of at least two tons of DDT (technical) Sir Gordon was good enough to arrange for this supply and on the 1st of July 1945 the first civilian home was sprayed in India with a five per cent solution of DDT in kerosene This was its maximum solubility As regards *dosage most arbitrarily* we sprayed a gallon of the five per cent solution over the walls and roof of four contiguous small houses each with spraying surface of 1000 square feet This corresponds to a dosage of 56 milligrams per square foot or roughly 0 5 gm/m² Subsequent work proved that we were extremely lucky in adopting this initial arbitrary dosage In the two villages in which we sprayed the solution on 1st of July *1945 we could not find a single adult fluviatilis* mosquito from any house or cattleshed either by daytime catches or even during night catches for as long as two months For quite a few weeks we could collect no mosquito whatever It was only in the middle of September that we started collect ing a very small number of adult *fluviatilis* in night catches

More than our own satisfaction with the high potency of the insecticide the enthusiasm of the people of the two villages that we sprayed was indescribable They found lizards cockroaches scorpions bedbugs ticks all disappear with this *single spray of* DDT *in kerosene* They hailed the drug as a wonder drug and urged that I should submit a scheme to Government to carry out a similar spraying programme thorughout what is called the malnad (or hilly) tract of Dharwar and Kanara districts The villagers request was entirely in line with my own inclinations and I lost no time

in preparing a scheme that was to benefit a thousand villages with a million population I provided for three cycles of spraying in a year at intervals of two months the first round to commence about two months ahead of and to be completed before the beginning of the malaria season The total cost was estimated to be a little over 100 000 dollars (10 U.S cents *per capita*) at the current rate of exchange though at the then rate of exchange the cost was 150 000 dollars or roughly 15 U S cents *per capita*

I was so thrilled with the scheme that I made a special trip to Poona the Headquarters of the Public Health Department to meet my director and canvass his support His first reaction was one of surprise that I should dare to put up a scheme costing half a million rupees for the control of one disease for a million people while the total public health appropriation for the whole province was only about two million rupees to serve thirty six million people I told him that the venture was no doubt daring but the results which would accrue were well worth it and indeed may pave the way for the later expansion of all other public health services In my impatience I did my director the injustice of imagining that his heart was not in it However I told him that as he was shortly going to Delhi he could perhaps discuss this scheme with Sir Gordon and ask for his technical advice In the meanwhile I had taken care to send a copy of my scheme to Sir Gordon and threw in a hint of my director s somewhat cold reception

Sir Gordon later described to me the scene in Delhi As my director was sighted along the verandah of the Malaria Institute of India Sir Gordon jumped from his seat rushed to the verandah and literally embraced my director and said

Dr G let me congratulate you on this magnificent cheme that you have submitted to your Government There is at least one director in the country who has imagination who has vision and who has the courage to think in terms of large-scale schemes You do not know *how it gladdened my heart* when I saw a copy of your scheme which Viswanathan sent me Verily Bombay would lead the way Let me congratulate you again! —all this in one breath without giving my poor director any chance to break in The result was that when he came back to Poona he called me and started asking me for the details of our scheme I knew then that the war *had been won in the battlefields of Delhi under the leadership* of Sir Gordon

According to the official protocols all new schemes should reach government by the first of October to give t me for their scrutiny in the administrative and finance depart ments of Government and the later presentation to the legislature usually during the month of March It is only after the legislature accords its sanction that funds could be allotted for expenditure during the next financial year from April 1 to the 31st of March We were already late for we were in the middle of October However my director was persuaded to submit the scheme for the special consideration of government

At that time Sir Henry Knight a most able if somewhat ruthless administrator was the chief adviser to the Bombay Government He was the terror of most of the high officials because he sufferred no fools and laggards I got word that he was planning to visit Kanara district and in his itinerary would be glad to include a very brief visit to my laboratory in Sirsi I got advice from my director how I should conduct

myself in order not to provoke the wrath of the high and mighty Sir Henry I was to content myself with giving monosyllabic answers and never to try to make any conversation on my own account

Sir Henry had asked me to let him have a short advance note on my work and on our future plans When he came to our lab he told me that he had read my note that he would give me exactly ten minutes by the watch that I should not *repeat myself* and *I could utilise that time usefully to supplement* whatever I had already stated in my note—and he began to look at his watch Nanjappa the Collector of Kanara was with him and he gave me the impression of thoroughly enjoying the situation I started repeating exactly what I had said in my note for in ten minutes I could do no better Apparently what I said did not appear to be "repetition When I came to the piece about heavy natural infections in the Kanara mosquito Sir Henry asked me Can you show me a natural infection ? This was just the kind of question which my colleague Ramachandra Rao was waiting for He grabbed Sir Henry by the arm and took him to the microscope It was a full hour before Sir Henry left our lab

Nanjappa told us that Sir Henry would soon be taking over as the Governor of Bombay because Lord Wavell the Viceroy of India was being summoned to London by the Labour Government which had assumed power in the United Kingdom to hold discussions on India s future and the Governor of Bombay would officiate for Lord Wavell as Viceroy I congratulated Sir Henry on his elevation and added that being an oriental I looked upon this as a happy augury of the good things to come for the malaria laboratory in Sirsi as an

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effective instrument of service to the people of the district Sir Henry turned round and asked me how much my scheme of malaria control would cost I said Half a million rupees for the two districts Is that all ? Sir Henry said Take it as sanctioned I then muttered almost to myself Every year Sir Henry said What do you say half a million rupees every year ? And for a place like Kanara which gave us not a single soldier during the present war ? —this despite the fact that Nanjappa the Collector who accompanied him had himself served in the war not to speak of my own temporary service on the Indo Burma roads I said This district had done a great service to government by not having any of its citizens enlist as a soldier for if they had enlisted government would only be obliged to maintain them in a base hospital because of their bloated bellies and pallid countenances and on account of their being the worst victims of malaria anywhere in the world But I added this district has given you its very best—its timber for building bridges on the Indo Burma roads It will take a couple of hundreds of years before the forests of Kanara are rehabilitated Further the district has an abundance of supari (a kind of palm which yields a nut used in chewing) and the Government of India are collecting an enormous sum by way of excise duty A small fraction of the revenue would be more than adequate to meet the bill for malaria control Sir Henry complimented me on my debating capacity and promised to do his very best to further the cause

Finally when he was about to leave I said that this scheme would also offer employment for a large number of servicemen in various grades on their demobilisation Their experience in the wartime antimalaria campaign would be of

very great use in implementing the programme Sir Henry nodded assent and took our leave

Nanjappa was one of the staunchest supporters of the scheme and he and Barve the Collector of Dharwar district were the two strongest pillars to support the scheme Government had a way of dealing with proposals made by heads of departments of comparatively recent constitution such as public health The government minute would state The Director of Public Health has made such and such proposals The Collector of the district does not agree with the Director of Public Health The Commissioner agrees with the Collector Government may therefore agree with the Commissioner and the Collector and disallow the Director s proposals The strong support of the two Collectors was therefore of special significance for this first large scale rural malaria control programme

History has a curious knack of repeating it elf Sir Ivor Taunton the adviser in public health to the Government of Bombay visited our laboratory in Sirsi towards the end of December 1945 We travelled together on the return journey and reached Poona on the morning of January 1 On opening the newspapers I read of the conferment of a knighthood in the New Year honours upon Sir Ivor By that time he and I had parted When I went to the office I wrote a letter of congratulations stating how Sir Henry got the joyous news of his promotion when he was with us in Sirsi and how now again Sir Ivor got his well merited distinction just on his return from a visit to our lab Surely if a visit to our laboratory produced so much good it should inevitably be made the most effective instrument of large scale public utility I showed this letter to my director and he was so

utterly taken aback at my daring that he said I should tear it up and write a more respectful letter For once I disregarded my chief s wishes and sent my letter to Sir Ivor as I had originally drafted it Two days later my director and my colleagues got an acknowledgment from Sir Ivor which had even his signature mimeographed I did not get any such acknowledgment and my director thought that I had put Sir Ivor in a huff The next day however brought a letter to me written in Sir Ivor s own hand and he said My dear Viswanathan I was racking my brains what on earth I had done to deserve this honour Your letter has at last put me wise to it Yes it is my visit to your lab that got me this distinction and let me tell you this you will not find me un grateful I shall have great pleasure in sanctioning your DDT scheme for Dharwar and Kanara districts

I had occasion to talk about this incident to Marshall C Balfour of the Rockefeller Foundation and he said I visited *your lab in Sirsi too but I did not get any good out of it* Mrs Balfour was with him at the time and I said Marshall how can you forget it so soon ? Do you not remember that your wife returned from U S landing at Goa and joined you at London just on your return journey from a visit to my lab ?

Balfour was one of the earliest American malariologists with a good record of work in many countries in the world notably in Greece But since his incursions into demography a change seems to have come over him Even in the last Christmas card that he was pleased to send me he expressed his good wishes for malaria eradication but he added that he was keeping his fingers crossed He is one of those who feel that injudicious and extensive malaria control methods in undevoloped countries might increase the population pressure

to such an extent that the reform may indeed defeat the purpose We have had several hectic arguments We cannot quieten him with the cheap retort that surely disease is not the way to bring about checks in population He has his point but even so the malariologist can only deal with his own field and while granting the need for undertaking effective measures against undue population growth one cannot obviously halt one s hands in serving humanity with available modern scientific knowledge in malaria control and eradication

Balfour was not alone in his ideology Dr John Matthai a distinguished economist and a former Finance Minister of the Government of India had occasion to visit Poona and see our charts in an exhibition put up in connection with the campaign for small savings When he saw the rise in population in Kanara district as a result of our malaria control measures *he said You are Public Enemy No 1 You deserve* to be nailed to the wall and shot dead You are finding me more mouths to feed I said But sir where is the guarantee that the next victim of the anopheles mosquito may not be a prospective Finance Minister of the Government of India ?

In February 1946 the DDT scheme for Dharwar and Kanara districts was sanctioned by Government when it was still under the British advisers regime A couple of months later the Congress party took office in Bombay State as in other States A later chapter deals with Mahatma Gandhi and malaria He had given us his assent to inaugurate the scheme My director and I therefore approached Dr Gilder the Minister for Health with the suggestion that the government should request Mahatma Gandhi to inaugurate the scheme and that its timing should be determined to suit his convenience While we were fervently hoping that this

would come to pass the political destinies of the nation required Mahatmaji's presence in Delhi and hence we were not privileged to have him inaugurate our scheme In his place the Honourable Balasaheb Kher the Chief Minister of the Bombay State inaugurated it on the 26th of September 1946 in Dharwar

The circumstances connected with this inauguration are somewhat odd and would bear narration There had been a change of person in the Collector of the district The ceremony was to be held in the Municipal Hall The Municipal Committee was keen on presenting an address of welcome to the Chief and Health Ministers The Municipal President claimed his right as the first citizen of the town that the municipal address should take precedence over the inauguration of the DDT scheme The Collector felt that as the main purpose of the Chief Minister's tour was inauguration of the DDT scheme and as the municipal address was only an offshoot the former ceremony should take precedence It was with some effort that the Collector was persuaded to agree to the Municipal President's point of view The Collector said that as the post of assistant director of public health (in charge malariology) which I then held was not mentioned in the book specifying the warrant of precedence I could not be accommodated on the dais on this occasion I said that it was perfectly all right by me But the Municipal President would have none of it He felt that being the author of the malaria control scheme which the Chief Minister was to inaugurate I certainly deserved to be seated on the dais and he would exercise his right as the President of the Municipality to give me a seat next to him on the dais This was eventually agreed to Later in the evening Nanjappa the

Collector of Kanara who was also invited for the occasion came to Dharwar Apparently according to procedures the Collector of one district had practically no *locus standi* in another district and he was told that he would not be entitled to any seat on the dais He came and saw me at the Travellers Bungalow and there was no option for me except to pass on to him the seat which had been reserved for me When the Municipal President heard of this and found himself unable to find any other seat for me on the dais he requested his Vice President who was given the first seat in the pit to vacate it in my favour

Later I met my director I had talked to him on the trunk telephone earlier with regard to the procedures to be adopted during the ceremony of inauguration He undertook to do the honours by way of inviting the Chief Minister to inaugurate the programme but he said naturally enough that I should furnish the necessary briefing material He had brought with him another colleague of mine from Poona and he insisted that this gentleman should be given a seat of honour and thus even the Vice President s seat which was reserved for me had to be given away to my colleague

The Chief Minister s party was to arrive by car from Belgaum I had arranged for a photograph to be taken of the two Ministers and the entire personnel of the malaria organisation and the only time that was available to us was when the Ministers were to have their lunch in the Collector s bungalow When I solicited the Collector s permission, I was told that it was not included in the Chief Minister s official programme and hence he could take no responsibility for it However I asked the photographer to make the necessary arrangements and kept my staff standing in position leaving

only a few chairs for the distinguished guests to occupy in the front row and I merely contented myself with taking the permission of the Collector to loiter in his compound until the august guests should arrive

All the district officers were lined up on the verandah of the Collector s bungalow to be introduced to the Ministers but being a head quarters man I was not included amongst those to be introduced

At about noontime the Chief Minister s party arrived in the Collector s bungalow The Chief Minister got out of the car and was inspecting the guard of honour As he was doing so he sighted me at a distance and he walked quickly towards me shook hands and asked me when I arrived I then made my request about the group photograph which he promptly agreed to comply with and called Dr Gilder the Collector and others

After lunch the party went to the Municipal Hall The Municipal address was first read and the inauguration of the DDT programme started next with my director s welcome address I was standing in the verandah I could see the Chief Minister look all over the dais and then I saw him whisper into Dr Gilder s ear who in his turn spoke to the Civil Surgeon He came to the verandah and told me that the Chief Minister wanted me on the dais When I went next to him he said Why are you hiding your light in a bushel ? It is your work that is being read by Dr Gandhi Come and sit next to me

A little later he started addressing the gathering and at the very start he took out a telegram he had just received from Mahatma Gandhi which read as follows Dr Gilder Health Minister Government of Bombay Dharwar Convey

Viswanathan my heartiest congratulations and best wishes for success his rural antimalaria campaign Dharwar and Kanara districts—Gandhi Even in the midst of his extremely busy national preoccupations Gandhiji did not forget to send us his blessings. The Chief Minister went into great ecstasy about the excellence of the scheme and its tremendous potential for the development of the two districts He assured the staff of the unflinching support of government so long as they lent themselves to discipline and carried out the commands of their leader

Bala Saheb had always a kind word for the malaria staff Whenever he was on the road and sighted a member of the squad with the stirrup pump he would stop his car get down pat the sprayman on his back and tell him in his own language You are Viswanathan s man You are doing good work The loyalty of the spraymen to the organisation and its ideals was by this generous token of encouragement from the highest person of the State greatly reinforced

Thus did a series of incidents which so damped one s spirits to begin with culminate in a public expression by the first citizen of the State of the great potentialities of the scheme of an assurance of Governmental support and above all of Mahatmaji s personal blessings

My staff went into a frenzy and actually chaired me from the place of meeting to the Dak Bungalow I did not however realise then that this was a carefully laid ruse to ensure that I paid the bill for a sumptuous dinner to the entire staff that evening in the refreshment room at the Hubli Railway Station

Having been inaugurated under such excellent auspices, the scheme went from strength to strength and secured for

itself that most unimpeachable sanction namely the will of the people *Indeed* public clamour was far in excess of our own capacity to expand It took us nearly four years before we could extend the service to benefit about eight million people We were firm in limiting the expansion of the programme to those areas in each district which our earlier surveys had shown us to be exposed to malaria risk Public clamour however wanted the scheme to be extended to *every village in every district whether or not there was malaria The people appreciated the improvement in the* health of their cattle even more than that of their children especially in those areas where malaria was not very endemic I sometimes used to twit small groups of farmers Yes you have got to pay a few hundreds of rupees if you want to buy a head of cattle but it costs you little to produce a child

The collateral benefits of this DDT service added to its popularity at all events at the commencement of the programme One particular benefit namely the eradication of human plague was vividly brought home to us by the villagers themselves Towards the end of 1946 as some of us were *walking along the boundary between* Bombay and Mysore States and visited six villages three in Bombay State and three in Mysore one or two answers was invariably given us when we inquired of the villagers if they had plague that year One was How can we get plague our village is being sprayed with *DDT The other* was *Yes we have plague because* our village is not being sprayed with DDT as in the neighbouring villages in Bombay State During the meetings of the Indian Council of Medical Research in November 1946 I communicated this piece of folklore for the information of the plague specialists and I asked *them to furnish an explanation*

as to how spraying only the walls and the roof without paying any attention whatever to the rat burrows could at all bring about an absence of plague I was advised that I must supplement my programme of spraying the walls and the roof with a *programme of insufflation of the rat burrows with* DDT This however was no answer to my question Next year we made some further expriments and showed that by merely spraying the walls and the roof the flea index in the rats could be brought down at least as low as if not even lower than by insufflation of the rat burrows themselves Despite the appalling housing conditions man has not yet derogated himself to the extent of living inside rat burrows Whether rats have their nests in burrows or the roof they have inevitable access to the houses and in their journey along the roof wall or wall floor junctions pick up enough DDT sprayed thereon to be lethal to the fleas which are parasitic on them

The other collateral benefits such as reduction of flies bed bugs nuisance mosquitoes etc failed to manifest them selves in subsequent years In fact such a failure began to operate against our scheme and numerous criticisms began to pour into government stating that the staff have gone slack and they were not as active during the second year as in the first Sometimes even a charge of deliberate adulteration of DDT with a view to its misuse was levelled By that time we had that most useful publication of th Communicable Diseases Centre of the United States Public Health Service listing a number of reasons why DDT was not so popular in the second year as in the first Whatever charges may have been levelled in the course of the spraying operations public opinion was unanimous at the end of the year that malaria

steadily went on declining The new generation both among officials and others that is not aware of the damage that malaria had caused in the past used to look with amusement on what to them appeared to be a wholly unnecessary DDT spraying programme This also led to a certain degree of refusals One other cause which brought about refusals was the opposition from the womenfolk of the Jain community on account of their religion which forbade any violence to any living being We took our difficulties to the religious leaders of this community and they promptly came to our rescue by suggesting to their fold that on the day on which their houses were sprayed with DDT the Jains should undertake a complete fast In such an event no sin would attach to the programme of destruction of mosquitoes with DDT Those were days when rationing of food articles was in full force Hence the suggestions of the religious heads of the Jain community really killed two birds with one stone (with apologies again to their creed of *ahimsa*)

The beneficent effects of the DDT service are described in another chapter Altogether there has been no large scale mass scheme which has produced such tangible dividends in the shortest period of time as the DDT service The results which have been demonstrated in a large part of the State of Bombay and the neighbouring State of Mysore played no small part in selling the proposition of a malaria control programme in the entire country

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THE DIVIDENDS OF THE PROGRAMME

In appraising the dividends of this programme the following sources have been taken into account —

1 The author s appraisal of the programme in Bombay State as published in his book Malaria and its Control in Bombay State in 1950

2 The assessment of the national malaria control programme of India by Dr B A Rao published in the Indian Journal of Malariology in December 1955

3 A survey of the economic status of villagers in a malaria irrigated tract in Mysore State in India before and after DDT residual insecticide spray by the workers in the Bureau of Malariology of the Mysore State Health Department in association with the Division of Medicine and Public Health of the Rockefeller Foundation in Mysore State published in the Indian Journal of Malariology in 1952

4 A critical appraisal of the programme by a committee of malariologists at the instance of the Government of India and the TCM/ICA of the United States

5 Projection of these experiences and an estimate of the probable dividends on the conclusion of the attack phase of the national malaria eradication programme

The author s appraisal of the results of the Bombay State Malaria Control Programme

In the hyperendemic malarial tracts of Kanara district there was a steady decimation of population as judged from the available census data from 1891 to 1941 from about

200 000 in 1891 to 146 000 in 1941 Along a narrow coastal strip of the same district the population growth was of the same order as in the rest of the Bombay State and had increased from 246 000 to 295 000 The cumulative effect in this heterogenous district, one group with intense malaria and the other relatively free was that population remained stationary for about fifty years from 1891 to 1941 With the advent of the DDT spraying programme in 1946 the population growth in the hilly malaria tracts of Kanara district is of the same order as elsewhere in the State Indeed in view of the extremely salubrious climate of the area once malaria had been eradicated the population growth even tended to be higher on account of a lowering of the death rate below that in other districts The mean birth rate in Kanara district from 1936 to 1946 was 31 per mille There has been a steady and slightly significant fall in the birth rates during this period but during the next few years after DDT spraying has been undertaken the birth rate has increased to 35 per mille Likewise the death rate which used to be about 26 per mille on the average between 1936 and 1946 with a tendency for a small steady fall during the period after the introduction of the DDT cheme fell to 16 per mille and in later years has gone down as low as 11 per mille The natural increase rate is therefore 24 per mille as against about 5 per mille in the pre-DDT period It should however be emphasised that this phenemenon has occurred only in the hyperendemic areas with extremely sparse population and with abundance of fertile virgin, unexploited land and forest. Hence demographers need not be unduly alarmed at what has been wrought in this district On the other hand economists and administrators may heave a sigh of satisfaction that instead of importing

manpower to exploit land in the district the sons and daughters of the soil will be available in future in adequate numbers for such purpose a much more dependable manpower than through colonisation or rehabilitation

The number of malaria cases that used to be reported by all dispensaries in this district was about 50 000 every year in the pre DDT period This has now been reduced to 1 500 a reduction of 97 per cent. What is surprising is not that the prevalence of malaria has been reduced by 97 per cent as shown by the dispensary figures but these figures should still show about 3 per cent of the previous amount of malaria when for several years in succession it has been extremely difficult to find more than a handful of specimens of the adult mosquito which transmits malaria in the area The author s only explanation is that in the tropics it will never be possible to eradicate malaria until the present generation of medical men die out for it is extremely difficult for them in clinical diagnosis to forget malaria as the most possible cause of any fever that they deal with Indeed occasional attempts to have blood slides taken from these clinically reported cases of Malaria have not only been consistently negative in microscopic examination but the very demand for blood slides from such cases has resulted in a vertical drop in the reported malaria cases from those dispensaries One does not desire to bring about malaria eradication by intimidation

In this connection it is worthwhile stating that with the complete stoppage of DDT spraying in the district with effect from January 1950 a house to house visit by specially employed surveillance staff at intervals varying from a fortnight to a month elicited a history of fever morbidity at the rate of about 17 per thousand Out of 14 121 fever cases from all of

whom blood was collected and examined only ten were found to contain malaria parasites Although careful epidemilogical investigation has not elicited definite evidence that these ten positive cases *were imported there is equally definite* evidence that they did not engender any secondary cases and the claim for malaria eradication in this area remains hitherto *well substantiated*

During 1949 when about six million people were under protection in Bombay State at least half a million cases of malaria have been saved at a total expenditure of 1 800 000 rupees A later estimation in Bombay State in 1955 shows that out of an estimated five or six million cases of malaria in the pre-DDT period there has been a reduction to the extent of almost 80 per cent

The collateral benefits of DDT have already been described in an earlier chapter such as the improvement of the health of cattle noticed by farmers presumably on account of the destruction of ticks which cause festering sores the total elimination of human plague and in some areas a slight reduction in the prevalence of diarrohea and dysentery These collateral benefits are so great that even when some untoward incident happened the public are anxious to suppress any connection between it and the DDT programme lest the Government should be persuaded to withhold the spraying operations from that area A prominent eye doctor from Bombay City happened to visit the coastal area in Kanara district in the earlier stages of the DDT compaign He found in one village which he visited quite a few cases of conjunctivitis which coincided in point of time with the DDT spraying carried out in that village He brought it to the notice of the department and the Minister in charge who was medical

great reputation in the State and desired that the matter might be investigated He did this in perfectly good faith and without any intention whatever to discredit the DDT campaign. But when one of us visited the village and started making enquiries not only did the villagers totally deny the prevalence of any case of conjunctivitis but even started attributing motives to the eye doctor for making a false report It was only with very great efforts that the truth was eventually ascertained that there were a few cases of conjunctivitis presumably spread by eye flies which incidentally are not destroyed by DDT at least when it is applied in the technique generally adopted in malaria control programmes

A public health practice should not concern itself with social reform However sometimes there is a repercussion between these two The State of Bombay as other States in India has a law that no one can obstruct anyone in the discharge of his duty by reason merely of his caste We had a quite a few numbers of the so-called scheduled caste people in our spray gangs Although in the first year some orthodox villagers used to object to such men entering their houses for spraying purposes and although we would be justified under the governmental laws in insisting that whatever men of whatever caste have been allotted for spraying those houses should be allowed to do so we could not make an issue of it and always tried to get the public on our side by persuasion It was amusing however when the good effects of spraying were appreciated there was no objection whatever on this ground excepting in a very small isolated section of population and indeed even the idols of Gods and Goddesses in these homes had a good bath of DDT spray mixture

The courtesy and hospitality extended to the author b householders in the remotest villages of Kanara district ver seldom visited by Government officials even of lower cate gories was a feature of special gratification One wishes tha one had the health and the capacity to stomach the cups o tea offered by so many people every day One villager of no very ample means insisted despite my protest that I should g to his house and have a cup of tea He added I do no often have the privilege of entertaining a representative of th Government of Bombay at an international conference H was referring to the Fourth Congress on Tropical Medicin and Malaria held in Washington in 1948 and the Malari Expert Committee of the World Health Organization interin Committee He had apparently read of my participation in those two conferences It was indeed a touching tribute from a villager and has therefore a far greater value than any praise from the highest quarters in the land

The author has had repeated occasions to discuss with people in villages the ways and means by which to continue the DDT spray as at that time malaria eradication and withdrawal of spray were not contemplated No one of course would gladly and willingly agree to measures of taxation But it is the author s firm opinion that a tax for DDT service was likely to be least unpopular for no measure has brought the governmental agency in such a close contact with every household in every village as the DDT scheme

B A Rao in his paper on the malaria control programme of India published in 1955 records that in 1954-55 there was a reduction of 19 4 million cases of malaria from similar figures for the previous year He further states that on the basis of three days sickness per case and a daily wage of Rs 2 the

amount of money saved would be very nearly 160 4 million rupees or 23 3 million dollars Although three days sickness per case is an under-estimate as not all cases would belong to the class of wage earners Rao s overall estimate may be accepted Only he has made no allowance in this particular paper for the loss of efficiency for the rest of the year in industrial or agricultural output on account of the attacks of malaria presumably because it is not capable of precise measurement One of the points to remember in Rao s evaluation is that even in the year 1953 54 there was a considerable reduction in the incidence of malaria in several parts of the country where DDT spraying had been in operation from a few years earlier For instance in Bombay State in 1953 54 the entire malarious area in the State was under protection—about 22 million out of a total of 36 million population And even in 1953 54 there was a reduction of more than two million cases of malaria in Bombay State itself

A more recent estimate by the end of 1957 placed the reduction in the incidence of malaria in the entire country at the level of about 40 millions from about 60 million cases of malaria prior to the introduction of the national programme

Assuming that about 50 per cent of the cases of malaria which have been saved are amongst wage earners and that each attack of malaria causes six days of loss of wage earning capacity in the whole year taking the primary attack and the relapses into account and assuming that the minimal daily wage is Rs 2 per head the total financial gain on account of a saving of 40 million cases in the country comes to 240 million rupees

It may be safely assumed that an attack of malaria reduces the wage earners efficiency by at least 25 per cent

for the rest of the year and if each wage earner may be assumed to have employment for 200 days in a year the financial loss on account of deficiency of output due to malaria will be about Rs 100 per wage earner The total savings on this account therefore comes to 2 billion rupees or about 400 millions dollars

One need not in this computation convert into cash several collateral benefits arising in a number of ways earlier indicated But a gain of considerable importance in the institution of the programme is the building up of an organization for carrying out this eradication programme which will remain a major asset in providing trained personnel and equipment for India s future health programmes thus extending the future effects of this process beyond the limits of malaria control

A survey of the economic status of villagers carried out in a malaria irrigated tract in Mysore State before and after DDT spray by officials of the Bureau of Malariology Mysore State Health Department in association with the Division of Medicine and Public Health of the Rockefeller Foundation and published in the Indian Journal of Malariology in December 1952 has brought out some extremely interesting features In each village families were chosen for this survey from groups having an annual income of less than Rs 500 between 500 and 1 000 between 1 000 and 1 500 and above Rs 1 500 The survey covered 29 families in the sprayed area and 31 in the unsprayed area By definition families were considered to include all the residents of a given dwelling The distribution of families by income groups was 60 per cent in the lowest category 25 in the next group 10 in the third and 5 per cent in the highest This distribution was more or less uniform

between the sprayed and unsprayed villages taken as a whole though naturally there were variations from village to village

The annual expenditure per family for dealing with sickness on account of malaria was about Rs 400 in the pre DDT period and Rs 60 in the post DDT period in the sprayed villages In the unsprayed villages similar expenditures during similar periods of time were Rs 250 and Rs 180 respectively While the ratio of post DDT to pre DDT period in expenditure for dealing with malaria was 0 1546 in sprayed villages the ratio in similar periods of time in the unsprayed group was 0 719 The annual loss of earnings per family on account of malaria either with the development of symptoms or with the supervention of mortality was Rs 656 in the pre DDT period and Rs 68 in the post DDT period in the sprayed villages, with a ratio of 0 104 while in unsprayed villages similar figures were Rs. 276 9 Rs 214 5 and 0 775

Total liabilities on account of sale of land and/or live stock and indebtedness incurred in the sprayed villages was Rs 401 4 per family in the pre DDT period and Rs 36 9 in the post DDT period with a ratio of 0 092 Similar figures for unsprayed villages were 146 6 106 2 and 0·724

In one representative sprayed village the annual expenditures in wages for labour imported because of shortage of local manpower for planting weeding harvesting and threshing pursuits in agriculture were Rs. 10 821 in the pre DDT period and Rs 2 654 in the post DDT period with a ratio of 0 245

Finally the annual per family acreage of farmland lying fallow including both wet and dry crops, was 2 in the pre-DDT period and 0 8 in the post DDT period with a ratio of

0 4 in the sprayed villages while in unsprayed villages similar figures were 3 0 2 9 and 0 967

Computing all these factors it has been estimated that while in the unsprayed family the savings in annual expenditure on medical care lost earnings etc during the period before the DDT scheme came into operation and later was about Rs 132 8 in a sprayed family similar savings amounted to Rs 926 8 The difference in savings between a sprayed and unsprayed family thus comes to Rs 794

The average family or household surveyed in these States consisted of 8 4 individuals and the *per capita* benefit therefore comes to Rs 94 5 per annum If to this were added the savings in wages otherwise paid for imported labour which comes to Rs 29 4 *per capita* the total savings *per capita* add up to Rs 123 9

Even not taking into account the productivity of the formerly fallow lands and increased yield from previously cultivated lands the net *per capita* benefit after taking the cost of application of DDT which is estimated in this area to be Rs 1 7 per head per annum comes to Rs 122 2

The authors conclude that the return on the investment of DDT spraying is seventy fold and they add that this compares well with a similar estimate made by the author of this book in Bombay State of a fifty fold dividend from the DDT scheme

Two United States and one British malariologists who constituted a team of evaluation of the national malaria control programme in India toured in the country between January and April 1957 and later furnished a most interesting and useful report They refer to various estimates of the economic

aspects of malaria eradication to Sinton s estimate of an annual loss of a billion rupees of Russell and Menon s estimate in South India of an average *per capita* loss due to malaria as Rs 3-14 0 at a time when the average daily wage per adult male was six annas of Mehta s report that as a direct result of malaria control in the Punjab since 1953 an increase of 130 562 acres in the cultivated area has resulted in three tehsils of Karnal district They state that in fourteen States in India on account of the reduction in malaria about three million dollars have been saved in the three year period during which malaria control operated They pay a legitimate tribute to the part that the Malaria Institute of India has played in the establishment of the national malaria control programme

An estimation of the probable dividends on the conclusion of the attack phase of the national eradication programme

As eradication connotes the total elimination of malaria one should reckon that there would be a saving of 60 million cases in the country Assuming 50 per cent to be wage earners and six days of loss of wage earning capacity on account of an attack of malaria with Rs 2 as the minimal daily wage the total saving on this account would be 360 million rupees Saving on account of improved efficiency of industrial and agricultural output would come to 3 billion rupees The total saving is thus 3 36 billion rupees or 672 million dollars The total expenditure on eradication during the next three years will be about 90 million dollars The dividend is therefore nearly 750 per cent every year

The modern way of life is always geared to monetary considerations While these figures therefore would prove satisfactory to the most hardboiled businessman one cannot

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known to modern medicine But when the diagnosis was made his friends and medical advisers including the conscientious but tactful Col Bhandari the Inspector General of Prisons persuaded him to take a few grains of quinine for a couple of days One does not know how much immunity or tolerance Gandhiji had for malarial infections but two days of treatment with a few grains of quinine got rid of a malignant malarial infection and it would appear he had no relapse whatever News of his illness reached Doctor Bidan Chandra Roy the Chief Minister West Bengal who was then with us in Sirsi the headquarters of the malaria organisation of Bombay State He had come to Sirsi to study the malaria problems in his then role as a member of the Bhore Committee We rushed him to Poona to see Gandhiji He offerred to get an ayurvedic drug from Calcutta by plane for the cure of Gandhiji s malaria Gandhiji it would seem politely declined and rumour has it that he told some of his colleagues later that he was certain that B C Roy s Ayurvedic medicine would have a core of pure quinine How well the shepherd knew his fold !

A couple of days later my staff and I had occasion to visit the Aga Khan palace where Gandhiji was in detention and its neighbourhood We collected in the space of half an hour about four hundred *Anopheles culicifacies* On dissection a couple of days later four of them were found infected with oocysts in the midgut We made permanent preparations of these infections and showed them to Gandhiji at a later date In my anxiety to impress I said These mosquitoes Sir probably gave you malaria Gandhiji replied with his inevitable smile Perhaps Dr Viswanathan I gave the poor insects malaria I then realised that great men s instincts seldom

failed them and how foolish I was to suggest that a mosquito was infective in the oocyst stage

This was my first contact with the great man and it would remain as vivid in my memory for a long time as a few subsequent contacts it was my privilege to have with him

I had word from Dr Jivraj Mehta another close disciple of Gandhiji and the present Finance Minister of the Government of Bombay asking me if I would undertake to give training in malaria to one Sankaran Nair an inmate of Gandhiji s ashram in Sevagram on the completion of his training as sanitary inspector in Bombay Naturally I agreed to undertake the task Nair proved an extremely good pupil and very tractable so long as he was with us During his stay with us he used to get fortnightly letters from Gandhiji making kind enquiries about his personal comforts thus revealing Gandhiji s love and affection for even the humblest of people that ever came in contact with him

As stated in an earlier chapter 1945 opened a new era in the history of malaria control in India I had occasion to go to Poona soon after my early experiments and thrills with the use of DDT in Kanara district Gandhiji was at that time in Poona I had word from a mutual friend F P Pocha a name famous in India for some of the best seeds and nursery in the country that I should go and pay my respects to Gandhiji One had naturally to work one s way to Gandhiji s presence through his faithful and constant medical attendant Dr Sushila Nayar While talking to her I had occasion to give expression to my dream of having a malaria control programme throughout the State of Bombay with the use of this wonderful new chemical DDT and I added that if the present British advisory regime continued I would have no

option except to invite the Viceroy or the Commander in Chief to inaugurate our first large scale scheme of rural malaria control If on the other hand a popular government was established in the Centre and in the States by that time, it would be my great privilege to request my health minister in Bombay State to secure Gandhiji s blessings at the ceremony of inauguration A little later we were ushered into Gandhiji s presence and the first question that Gandhiji asked me was if I knew Hindi and in what language do you think was this question framed ?—in Tamil my mother tongue which Gandhiji had learnt in South Africa on account of his association with a number of workers from Tamilnad I had to confess to my total ignorance of the language Sushila Nayar then said Doctor tell Bapuji what you were telling me about your dream I pretended to be greatly embarrassed *and in an aside whispered—audibly enough—that it was meant* purely in joke and only for Sushila Nayar s information. Gandhiji said Doctor Viswanathan I could also appreciate a joke Please tell me what it is I then repeated my idea about inviting Mahatma Gandhi or the Viceroy to inaugurate the *DDT* scheme *in Bombay State* depending on whether a popular Government was installed or not Gandhiji burst out laughing which I understand is the surest prelude to a considerable rise of the visitor s stock amongst Gandhiji s close associates

Gandhiji then said that as soon as the Congress Govern ment came into power in Bombay State he would invite me *to go to Sevagram and advise on malaria control* in the ashram a privilege which was given to me soon after Dr Gilder assumed charge as Minister for Health in the Government of Bombay early in 1946

Jivraj Mehta was our leader He had not then joined the Government of Bombay Das Gupta (who was then the Health Officer in the Bombay Corporation) and Wadia (who was an Engineer under the City Improvement Trust Nagpur) were with us as well as the Minister of Health of Madhya Pradesh his Director of Health Services Malariologist etc We surveyed our respective fields and made suitable suggestions to our leader Gandhiji we were told would accept only those suggestions which would be practicable and capable of extension to every one of the seven hundred thousand villages in the country He would not countenance any special efforts for Sevagram because of its importance as the centre of his activities There are enough people in India who would get the streets of Sevagram paved with gold if Gandhiji cared but obviously Gandhiji s wish was attuned to the uplift of all the villages of the country for which Sevagram should be a model

Jivraj Mehta briefly mentioned my suggestion about the DDT spray in Sevagram and its estimated cost of about 10 U S *cents per capita* *Gandhiji promptly accepted* the idea and said that i was economically practicable to adopt such a scheme throughout the country and the expenditure was far less than the economic loss that the disease effected in the country Sitting close at his feet was Rajkumariji who had not then assumed position as the Health Minister for the Government of India She said Bapuji how can you accept such a scheme which involves destruction of mosquitoes ? How does it square with your creed of ahimsa ? Gandhiji turned his head in my direction and smiled I looked upon *it as an invitation that I should answer the question if I dared and* cared I said, Sir if I put a barbed wire fencing around my

house and if a thief scales over it in his attempt to rob me of my belongings and gets bleeding injuries all over his body would you charge me with committing violence on his person ? I do not propose to catch a mosquito open its jaws wide and put DDT in its mouth I am only spraying the inside of the walls and the roof of my house The mosquito has the whole of the universe to pick for its meal of blood Why should it come inside my house and seek my blood ? If it does and in the process it gets killed surely it does not militate against ahimsa Gandhiji burst out laughing and I felt sure that the scheme was sold in the country

At that same conference Wadia suggested a number of useful means of improving rural water supplies and rural environmental sanitation especially the construction of latrines of a sanitary type Talking about water supplies he said that all stepwells should be converted into drawwells in order he said inadvertently to prevent the prevalence of hookworm Gandhiji promptly interposed You mean guinea worm —yet another demonstration of the unerring knowledge or instinct of great men regarding the fundamentals of every branch of science or the humanities

In such a favourable background I took courage to remind Gandhiji of his promise to inaugurate the first large scale rural malaria control scheme contemplated in Bombay State during that year Gandhiji at once said that he would be delighted to come and take part but he added one condition that at the ceremony of inauguration I should address the gathering in Hindi

Months rolled on and I had occasion to remind Dr Gilder of the plan to invite Gandhiji to inaugurate our endeavour Gilder asked me if before he could take up

Gandhiji s time in this way I could guarantee that the scheme would succeed I told him that I wanted Gandhiji to inaugurate the scheme in order to make it succeed and be sides to such a distinguished member of the curative medical profession as Dr Gilder was it was needless to elaborate the theme that so long as there was life there was hope and human endeavour was not always undertaken with a certainty of full fruition

Later political events took an important turn in the country and Gandhiji s presence was urgently necessary in Delhi to shape the destinies of the nation and the constitution of an independent India In spite of his preoccupations as described in an earlier chapter Gandhiji remembered to send us his blessings on the 26th of September 1946 when the Honourable Shri Balasaheb Kher inaugurated our first large scale rural malaria control scheme in Dharwar and Kanara districts

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7

THE IMPACT OF PERSONALITIES

This programme would not have been possible but for the impact of some forceful personalities both from India and the United States If a few of them are mentioned in this chapter it is by no means with a view to be exhaustive of all persons who contributed to the success of the project but only by way of illustration of the well know fact how a few men may unconsciously bring about a revolutionary advance in social affairs The role of technical men paid for the purpose of improving health is perhaps not to be specially lauded but that of other personalities mentioned in this chapter should be cherished long for the contribution to a great cause affecting the health of millions of people of this country

Before describing the personalities of the two countries one should refer to that great personality who transcends all limitations of time and space Mahatma Gandhi whose blessing for this project is in the author s humble opinion the most effective single cause in securing wholehearted public co-operation and in bringing about the most spectacular dividends in human endeavour within the shortest period of time

If Rajkumari Amrit Kaur with her characteristic energy *and sweet power of persuasion was responsible for the* initiation of the programme and for successfully crossing over several administrative hurdles that came in the way Shri D P Karmarkar her successor in office as the Minister of Health of the Government of India has not only the credit *for having expanded the programme throughout the malarious*

areas of all the States in the country but he has also that unique credit for having more recently undertaken the responsibility for a complete eradication of the disease in the country and thus for having set on foot the world s largest disease eradication programme ever in its history

The Planning Commission of the Government of India and its Health Adviser Dr Lakshminarayana are to be specially congratulated in accepting a scheme of this magnitude and giving it a high priority

The Secretariat in the Ministry of Health headed by Mr P M Menon I C S in the earlier stages and by Mr V K B Pillai I C S later gave their very best to put the scheme into action with least delay Mr Pillai s dynamism and his capacity to overcome difficulties are well known And the speed with which the national eradication programme was recently sanctioned by Government furnishes an example of his determination and energy

Dr Raja the Director General of Health Services at the earlier stages when the plan was under contemplation had no difficulty in giving his best attention because it was more or less a logical outcome of an earlier recommendation made by the Bhore Committee of which he was the distinguished secretary Col Lakshmanan his successor in office who was associated with the programme right from its inception, and who was also responsible for its reorientation to a programme of eradication was a tower of strength at all stages While on the one hand he was able to share the experiences of the Indian programme with his colleagues in the World Health Assembly and its executive board he was also able to utilise the combined counsel of his colleagues in these institutions for improving his own national programme

The State malaria organisations in general and the Bombay State malaria organisation in particular played a notable part in the formulation of the programme in its earlier stages In its implementation all State organisations gave their best though naturally the efficacy of performance varied from State to State

It is out of no sense of flattery that I would like to place on record the extremely useful personal interest evinced by the late Bala Saheb Kher as Chief Minister of Bombay State and his dynamic successor Shri Morarji Desai Dr Jivraj Mehta as Finance Minister of Bombay State and an elder statesman—adviser in health matters at the national level gave his wholehearted support Above all Dr M D D Gilder the Health Minister gave the programme its prestige through his unfailing wise guidance and timely intervention at the appropriate level to steer it through earlier difficulties These foundations so ably laid by him were built up by his successor Shri Shantilal Shah who if he lacked the professional reputation of his distinguished predecessor exhibited an administrative zeal and firmness tinged with sympathy and understanding which evoked the admiration of both officials and non-officials In this task he was ably supported by a seemingly mild mannered but determined deputy Shri B D Jatti who is happily now the Chief Minister Mysore State

Finally full measure of credit should be given to Col Jaswant Singh as the principal architect of the national plan in all its stages Some people may feel resentful at Jaswant Singh s reluctance to be driven into speed but I have always found him a master craftsman He knows how to time his strokes and secure sure runs for his team One thing however

is certain His knowledge understanding and handling of international men and affairs provide a gift seldom equalled in others As a most charming host he had the sure faculty of gathering the support of every person he came in contact with

If Jaswant was all that was admirable in the field of statesmanship and administration his deputy Dr B A Rao was no less useful in the technical organisation at every stage of the project B A Rao it may safely be said is the greatest serving Indian malariologist in the technical field He has the longest period of service in the field of malaria to his credit of nearly thirty years Incidentally he and I may have to fight a duel to determine which of us is senior in the field of malariology the difference not being of course more than a few weeks one way or the other In the pre DDT era he has given the most remarkable service to his State He was almost the first malariologist in India to make the entire engineering service in his State to appreciate the need for a prior consulta tion with the malariologist in any engineering scheme at the time of its designing or implementation The alterations in the engineering techniques that he had succeeded in bringing the State authorities to agree to would have provided one of the most thrilling experiences of a public health administrator in the field of co-operative enterprise for the good of humanity Alas DDT came in and made all this painstaking effort *seem* wholly unnecessary

B A Rao was not one of those single track minded malariologists who shed a tear when good and meritorious service in a particular method has suddenly to be given up and a wholly new venture taken up He readily took to DDT and demonstrated his capacity for organisation and technical

administration It is therefore no small wonder that he was roped into the national programme as Jaswant s deputy And it is a source of greater satisfaction still that with Jaswant s elevation to a general post of higher responsibility B A Rao is put in charge of the national malaria eradication project Not always does a beautiful damsel in a remote village become the reigning beauty of the capital !

Several other names come up before the mind but space forbids any more detailed narration Apart from these names there is no doubt that the relatively unknown spray men in the villages at the periphery constitute the real brick and *mortar of this architecture And no praise will be too great* for their contribution to the success of the programme

Amongst the American architects the pride of place should no doubt go to H E Chester Bowles the then ambassador in *India His enthusiasm for the project has been ably* maintained by his successors The present ambassador H E Ellsworth Bunker has made it possible for the two countries to sign an agreement for a total eradication of the disease

The head of the Technical Co-operation Mission in India Mr Clifford Wilson took a leading part in the earlier stages of this bilateral programme His role is ably continued by the present Minister-Director of the TCM Mr Houston

Dr Estella Ford Warner brought to bear all her experience in the United States Public Health Service in assisting Jaswant in preparing the national programme As Health Adviser in the Directorate General of Health Services she took an abiding interest in the further stages of the consideration of the programme and its sanction and implementation Her role was continued by her successor Dr John C Hume whose extreme modesty masked his great ability

as an epidemiologist He was greatly responsible for the conversion of this bilateral programme f om control to eradication

Two names I have reserved to the last. They in my opinion have contributed the greatest share in the contemplation of such a project One of them outlined its essential details in the first instance Robert Briggs Watson of the Rockefeller Foundation has placed himself under a deep debt of the nation s gratitude for the strenuous part he played in the earlier stages Although the fulfilment of the programme is in accordance with the general policy of the Rockefeller Foundation of striving for the greatest good to the greatest number without distinction of race caste or creed, it was not one of the specific objectives of the Rockefeller Foundation in India to advise the Government in any such large scale national programmes The initiative taken by Watson therefore is all the more laudable Great movements have a knack of appearing to originate spontaneou.'y Some opportunists hasten to associate themselves with such movements at the right time and succeed in establishing a [illegible] tion In other instances large scale [illegible] progress logically and steadily from stage [illegible] different people are associated with them a [illegible] and the impact of personality is forgotten [illegible] I the present scheme the imagination was [illegible] The earlier impetus was all due to the [illegible] ality both in India and the United States [illegible] that he readily carried the embassy circles [illegible] both in equal measure As soon however [illegible] had a chance of acceptance by the concerned [illegible] Watson dropped out of the picture There is [illegible] in the

records of the Government to show Watson s share in the formulation of the scheme in its earlier stages and hence no one would dispute the homage that the author has expressed in this chapter to the most useful part played by him in having made this programme possible

Dr Austin Kerr s contribution is nowhere on record He was a true catalyst Only those that took part in the earlier reaction were aware of the presence of this catalytic agent Historical accuracy compels me to pay my homage to the silent contribution of Dr A Kerr in the earlier stages of the consideration of this programme

The Rockefeller Foundation placed the services of Fred Knipe engineer at the disposal of the Government of India His contribution to the national scheme has not been as well publicised as it deserves He stimulated Indian manufacturers and has made them produce within the country spray pumps which will compare with imported appliances in cost and quality He has a genius for exploring indigenous talent indigenous resources and indegenous capacity

In this connection the contribution made by UNICEF in establishing two plants for manufacturing DDT in India deserves special mention

The author is unaware of the names of yet other great personalities who were connected with this programme in the later stages both at the technical and administrative levels The omission to mention their names is therefore by no means deliberate but is purely due to ignorance That there should have been a host of such people is obvious To them all including the U S taxpayer the homage of the citizens of India is due for having made this large scale bilateral programme possible

8

MY MISTAKES

If I indulge in a little introspection in this chapter it is for two purposes The first is to emphasise that there has been no malice to tinge my imperfections and the second is to make public amends for any offence which I may have caused my friends on account of my imperfections

My mistakes in so far as my official duties are concerned may be broadly grouped under

1 Excessive enthusiasm and extreme impatience

2 Lack of tact and diplomacy and a reputation to call a spade a spade and

3 Talking too fast and too much

My enthusiasm for urging the large scale use of DDT is by no means unique Subsequently I have ascertained that practically in every country of the world the early spectacular successes attending the use of DDT in a pilot experiment have invariably provided the sponsors with an urge to plead for the most rapid countrywide use of the insecticide In those days I used to be called a DDT fiend I remember a meeting of the Indian Council of Medical Research where I had perhaps overstretched myself in my advocacy of DDT This was in 1945 Later in the evening when tea was served someone complained that the brew was bad Colonel Ahuja the then Director of the Kasauli Research Institute and now Medical Adviser to the High Commissioner for India in London, said Ask Viswanathan he will put in a grain of DDT and make the tea good!

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Even at the earlier meeting I was besieged with a number of questions from top ranking Indian public health administrators if I honestly believed that I could get the Government of Bombay to sanction half a million rupees for the control of one disease in a million people while the total public health budget was only 2 million rupees for the whole State with 36 million people and if I further expected a similar expansion of the project throughout the State in the first instance and throughout the country in due course My only satisfaction is that some of these administrators themselves claimed authorship of the national malaria control programme about seven years later!

It was again purely out of my enthusiasm and impatience that I canvassed the support of Shri B G Kher and Dr Gilder and tried to get them to influence the Prime Minister of India forgetting a very important fact that any scheme of such magnitude had to be processed at various levels However it was gratifying that the Prime Minister was good enough to express an interest in this scheme Later when I had occasion to refer to this correspondence in my talks with Raja he brought to my notice the protocols that one has to go through and said What can the Prime Minister do in this case? In my impatience I was foolish enough to retort Yes Raja what can the poor Prime Minister do with you and me to advise him?

It was again out of this impatience that I tried to get a *friend to influence a distinguished member of the Union* Cabinet and through him to persuade Rajkumariji to revive some of the earlier aspects of the programme which had since been revised by the national officials This revival was not necessary as subsequent experience has proved but holding

the view firmly that it was vital I spared no pains to secure it My impatience led me to resort to means which could not in their very nature succeed but might conceivably cause embarrassment to friends and sponsors and resentment to those who are in authority

As a part of this project the States were to get free supply of transport vehicles for carrying men and materials to villages The national laws provide for the levy of customs duty on all imported vehicles and we were told that even vehicles supplied free of cost would not be exempt from this duty It was further ruled that as the State Governments were the beneficiaries they would have to pay the customs duty which would increase the revenues of the Union Government Bombay State was to get nearly a hundred vehicles The customs duty on each was about 1 000 dollars This meant that the State Government had to find an additional budget of 100 000 dollars Most of us in charge of the State malaria organisations felt very bitter and resentful that the Government of India should make money out of the supplies made by a friendly country for a large scale disease control programme I happened to mention this to Shrimati Durgabai Deshmukh the Chairman of the Central Social Welfare Board and wife of the then Finance Minister of the Government or India She asked for a note on the subject and promised to discuss the matter with her husband and see what could be done We were later told that the rules were inviolable but it would be possible for the Government of India to consider giving a grant in aid to the State Governments equal in amount to the customs duty paid by them Rajkumariji was already taking energetic steps in this direction at the official level and I gathered that my interference in this manner was deemed

officious—yet another instance of my enthusiasm misfiring But months rolled on and nothing happened Later in the year I had occasion to review the researches on malaria which had taken place in India under the auspices of the Indian *Council of Medical Research* at a meeting over which Rajkumariji presided In my address I referred to the hard ship to the States arising out of the levy of the customs duty on vehicles supplied free of cost for a disease control programme and I said Madam let not the rich man s gift break the poor man s back I later discovered that with this outspokenness I had earned for myself a distinction for tactlessness

We started the programme in 1953 in Bombay State with all fanfare and trumpets and a public ceremony of inauguration at the hands of the late Shri Girja Shankar Bajpai the then Governor of Bombay who had for eighteen long years toiled as Secretary for that curious mixture of portfolios Education *Health and Lands in the Central Government and had* been associated with malaria research We were suddenly told that sprayers and transport vehicles would not arrive in time before we could start the first round of spray and asked if we could reconcile ourselves to the possibility of the programme being delayed by a year The Bombay Govern ment had time and again expressed their determination to expand the programme throughout the State even before the possibility of bilateral assistance from the United States was considered possible. And now after all the arrangements at *the State level had been completed to be told that we might* have to wait for a year was a big blow to us All glory to the Government of Bombay that they provided the consider able amount of extra finance that was needed for hiring

nearly a hundred transport trucks throughout the State for a period of three or four months and for getting the two or three spray pump manufacturers in the city of Bombay to work on shift system and to supply us with our total requirements of the spray pumps in 1953 itself We were thus able to keep to our schedule in spite of the delay in the receipt of essential supplies from abroad—thanks to the wisdom and generosity of the Government of Bombay

The most glaring mistake I made was to make the suggestion that the whole national programme must be under a separate full time director and joint director and should not be the direct responsibility of the Director of the Malaria Institute I have had the ironical but none the less true experience in my extremely limited official sphere of finding that some of my proposals were accepted after a lag of three to five years by which time the authorship of the proposals would of course be forgotten That is no loss to the country whatever and the acceptance of the proposals a few years later may even be conceivably for the good of the country But human mind is usually small and vain and laments that its own creation did not find acceptance in the very beginning itself I understand that a proposal to place the national malaria eradication programme recently undertaken by Government under the hands of a full time separate director is under active consideration Likewise yet another proposal that I made to begin with to constitute five or six regional organisations to provide technical skill co-ordination and supervision for the benefit of some of those States which may not have an adequately staffed headquarters malaria organisation has also been accepted by Government and will be fully implemented very soon

It is also apposite in this connection to refer to my experience with the national filariasis control programme This programme is said to be the outcome of a research project which was carried out under the auspices of the Indian Council of Medical Research in Orissa State The purpose was to find out which of the three methods of heterazan therapy anti adult mosquito measures and anti larval mosquito measures carried out singly is attendant with beneficent results in reducing the incidence of filariasis The results at *the end of five years showed that heterazan therapy kept* down the micro-filariae prevalence rate and the mosquito infection rates for a period of two years but later they steadily rose to the pre-treatment levels Anti adult mosquito measures by themselves showed no significant change in the endemicity rate Anti larval measures started showing a reduction in the micro filariae prevalence rate with effect from the fourth year onwards From this rather slender foundation the national programme was immediately launched providing for a combination of heterazan therapy and anti-adult mosquito measures in rural areas and these combined with anti-larval measures in urban areas It was also provided that the larvicides would include residual insecticides Five years ago I suggested during the course of a discussion of this programme when it was in the stage of formulation that we could not bank on heterazan therapy for a whole mass of population though it would prove a useful supplement to effective mosquito control measures that anti adult mosquito measures in rural areas against *Culex fatigans* were not likely to be successful with the present residual insecticides and the inclusion of *residual insecticides in larvicides was likely to* be most harmful in that it would speed up the development of

resistance of the vector species against the insecticide I there fore said that the larvicide should consist of the usual oils with necessary fortifications but no residual insecticides It is gratifying to hear that five years later these proposals are now actively contemplated at least as an experimental measure before the national scheme is expanded throughout the country

The desire to have a cheap retort has always stood me in bad stead The late Sir Malcolm Watson happened to visit us in the Pasteur Institute Shillong when I was Research Officer of the Assam Medical Society which was financed mostly by Government and partly by the tea and other industries in Assam The Ross School of Hygiene London of which Sir Malcolm was the then Director took a consider able part in advising the tea industry on their malaria control operations through the Asia branch of the School in Calcutta In one sense therefore shorn of all niceties we may be said to be rival street dogs trying to pick at the same bone In that process there is no wonder that sometimes we growled at each other though outwardly we were working harmoniously Indeed the Director of the Ross School in India was a member of the governing body of our Society We were supposed to be influenced by government and the support of the tea industry was in the opinion of Sir Malcolm given to our Society purely because of this single factor Indeed he went to the extent of stating that the tea industry looked upon their support to us as blackmail which was rather greatly derogatory to our technical competence When he said that I could not help retorting if he has heard what some other tea industry people have told me about their contribution to the Ross School Sir Malcolm asked me, What is that?

and I said pinjrapole (this is an institution in India where the old decrepit and infirm cattle are kept and fed) Naturally the retort infuriated Sir Malcolm and he left us Jungle clearance and drainage two most popular and beneficial measures in malaria control carried out under the leadership of Sir Malcolm *in Malaya would have led entirely to contrary* results if adopted elsewhere with different vector species Indeed even in Malaya if Sir Malcolm had not had the grace of Providence in choosing jungle clearance in the coastal mangrove swamp and had instead recommended this method in the hilly tract infested with *A maculatus* the history of malaria control in Malaya would have been quite different *Likewise a million pound sterling scheme of drainage* suggested and partially carried out in the Doom Doma tea gardens of Assam resulted in so much increase in malaria—because of the difference in the breeding habit of the Assam vector—that a malariologist had to wait till the then generation of the superintendents and managers retired from service before he could cross the tea garden fence and whisper malaria control I myself have been culpable of ignoring the fundamental principle that a sound anti malaria measure against one vector species might conceivably add to the prevalence of malaria transmitted by another vector species Soon after my return from Malaya in 1934 when funds were placed at my disposal on a scale more generous than ever before I immediately undertook a scheme of sub-soil drainage on the lines I had seen in Malaya My drainage scheme was properly carried out in so far as the constructional details were concerned but it made no effect whatever on the prevalence of malaria because I failed to realise that *fluviatilis* was not alas !—*maculatus*

However Sir Malcolm was one of the pioneers who exploited Sir Ronald Ross epoch making discovery and certainly deserved much greater respect and regard than I showed in this encounter This was brought home to me even more forcefully when I found that Sir Malcolm whom I met in Washington in 1948 was extremely affable kind and sym pathetic to me and had nothing but words of praise for the activities of the Bombay Malaria Organisation of which I was in charge

There was yet another benefactor of the Assam Medical Research Society who at the time of my joining it was the Chief Secretary to the Government of Assam—Sir Harold Denehy In the course of a conversation he asked me which part of India I came from I said Madras Sir Harold said Oh! another Madrassee peacefully penetrating Assam I said "Thank you very much Sir for qualifying my penetration at least as peaceful The interview ended and I have reason to believe that this cost me a substantial promotion in that State That by itself is not a serious loss for I have had my fair share of promotions since but I certainly antagonised one who was so useful in the creation of the Society—my then employer—and its sustenance throughout its existence

These two instances may well have cost my job but my chief Colonel Anderson was one of those rare men straight as a die Instead of admonishing me—which he had a right to do—he went to the extent of complimenting me and had always given me the benefit of his wise counsel and mature experience

Two other instances of my enthusiasm for making retorts may be mentioned here

When I landed in Baltimore in 1936 the landlady of the house where I stayed came and sat near to me in the lounge on the first evening and after a few minutes of general conversation suddenly pounced upon me the question Do you people in India still drown your girl babies in the Ganges? For the fraction of a moment I was taken aback that a mother *and a grandmother should frame such a preposterous question* but I very quickly allowed my humour to get the better of me and said Yes Mrs Weiss we still do and you see me before you the offspring of two male parents I am afraid she did not get it and if she is alive today she may not have got it yet

The next day I went to the School of Hygiene and was talking to Dr D In the course of conversation he asked me where I had my schooling I said India He said I mean in medicine I said India What about public health ? I still answered India Then he asked me if I had spent some time in England I said No I propose to visit that country on my way back Then he said How come that you speak as good English as any of us? I said Excuse me Dr D I have not heard English spoken in this country yet

Finally I should refer to my imperfection of talking too fast and too much This is a deliberate imperfection but *which has alas! taken* possession of me *irretrievably A public* health administrator gets few chances of contact with secretaries and ministers The few opportunities he gets he has to make the best use of He should therefore provide the maximum information in the minimum time he has at his disposal Talking too fast and talking too much are therefore perhaps inevitable In doing so he often sacrifices his own

reputation and lays himself open to this kind of criticism from the very administrators with whom he has been talking However if his attempt to talk too fast and too much results in some effect by way of creating an impression on the part of the secretary or the minister the loss of the reputation of the public health man is indeed a worthwhile sacrifice At least it is that spirit that has dominated me in my official conduct for over thirty years Unfortunately having developed the habit one finds it difficult to wean oneself from it and this habit is a positive disability in international conferences I have known occasions when some foreign participants and interpreters have out of disgust given up any attempt to listen to my contribution Sir Gordon Covell who took a great deal of interest in broadcasting our effort in Bombay State time and again used to caution me to talk slow in such gatherings I used to make an honest effort When at the end I used to ask Sir Gordon if I carried out his advice effectively he would say Viswanathan you started off magnificently slow and deliberate with good pauses but in a few minutes the howitzer gun was brought into play to the utter disability of many foreign participants

Impatience with one s colleagues or sup riors in the hierarchy of administration is only likely to do harm to one s self and one would well deserve it but impatience to subordinates often betrays an act of cowardice for the subordinates are unable to retort or much less to retaliate Though I have not always been able to shed my impatience in my dealings with my subordinates it has been my greatest good fortune that I have had nothing but the most loyal co-operation on the part of all my coll agues right from the lowest to the highest level They had more occasions to know me

and they perhaps used to feel that the barking dog seldom bites

May I conclude this chapter once again with a profound expression of my apologies to those of my colleagues whom I might have unwittingly offended in my excessive enthusiasm for the cause I may have advocated and in my impatience to get things done in the manner in and the speed with which I needed them to be

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9

DREAMLAND

There is a superstition in some of the southern parts of India that dreams which occur in certain parts of the night have a certainty of coming true later Obviously one cannot vouch for the correctness of such a prevalent notion But it has been the author s rather good fortune that some of his dreams have come true in a remarkably short period of time The odds were heavy when the large scale DDT scheme was first contemplated in Bombay State but circumstances and the blessings of great men both amongst official and the non official world such as Sir Henry Knight Sir Ivor Taunton Sir Gordon Covell Mahatma Gandhi Shri B G Kher Dr M D D Gilder etc not only made it possible for the Public Health Department in Bombay to undertake a large rural malaria control scheme but gradually to expand it so as to protect nearly ten million people before the national scheme came into the picture In narrating the progress thus achieved in Bombay State the author gave expression to his dream in his book published in 1950 suggesting that President Truman s Point Four and the World Health Organization cannot find a better scheme for financial support than a nation wide malaria control scheme in India In less than three years with the generous assistance from the U.S the national malaria control programme had come into operation

Although there is no evidence of any resistance on the part of any of the anophelenes in Bombay State the possibility of eradication and withdrawal of spraying became manifest in Kanara district Likewise the danger of omitting from the

scope of the national programme areas hitherto considered as not endemic for malaria was also brought home In fact in our search for material for teaching purposes in malaria we found that we could get positive blood slides only from villages hitherto labelled as non endemic and not included in the spraying programme Suitable adjustments were therefore proposed in Bombay State after some years of operation of the State wide malaria control programme with a view to reorientate it towards eradication The whole country is now ready for it and has accepted it

The role of the World Health Organization was only to supplement but not to supplant existing resources So long therefore as India was fully served by bilateral assistance from the United States there was no occasion for the World Health Organization to offer any assistance but as if to make the author s dream expressed in his book in *1950* come true the World Health Organization has also been drafted into the programme of malaria eradication in India in 1958 by a substantial measure of financial assistance to supplement the much larger assistance directly given by United States

In conformity with his previous experiences the author would like to give expression to yet another dream By the end of *1960* the attack phase of the eradication *programme* would be completed and the consolidation phase would just have commenced By that time transmission of the disease would be almost completely if not completely interrupted if the logistics now planned are effectively implemented in every State

Would it not then be a suitable occasion to raise a tax *or a fee or call it what you like in commemoration* of malaria eradication ? Even if each family were to subscribe at the

rate of one to five rupees per year—or an average of Rs 2—for each of the five years in the third plan period the nation should be able to collect about 160 million rupees each year or 800 million rupees in the five years The benefits which would accrue to each family would certainly be several times the fee now proposed to be collected One of the relieving features of this proposal is that contrary to some other methods of tax collection this fee is levied after the goods are delivered It is well known that several municipalities in India collect water and drainage tax from the taxpayers for several years before the construction of the water supply scheme or the drainage scheme is actually taken on hand The law allows it and public opinion bows to it in the hope that some day the much needed amenity will be put into effect The present proposal on the other hand contemplates the collection of a fee after benefits have been fully made available 800 million rupees thus collected would go a great way in providing funds for radically improving the health services in the entire country through a system of primary health units secondary health centres improved epidemiological laboratory diagnostic and other services large scale disease control programmes such as in the fields of tuberculosis and leprosy family planning nutrition programmes health education industrial health etc etc to mention only a few Along with a vigorous drive for environmental sanitation (water supply and drainage) already taken on hand these services would bring India among the front line of countries which have made great strides since the turn of the century in the field of healthful living A nation s health is a nation s asset but dividends need investments

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